within surface soil were compared to the Region 9 PRGs and DAF 10 SSLs, and the results are presented as **Table 4.15-1**. The distribution of VOCs is provided as **Figure 4.0.1-1**. Surface soil detects of VOCs were below the PRG and DAF 10 SSL.

SVOCs

SVOCs were detected in surface soil samples collected for the AOC 18 investigation with the exception of AOC18SB6. SVOCs detected within AOC 18 surface soils included various PAHs. Detected concentrations of SVOCs within surface soil were compared to the Region 9 PRGs and DAF 10 SSLs, and the results are presented as **Table 4.15-2**. The concentrations of four PAHs exceeded the PRG, and concentrations of two PAHs exceeded both the PRG and the DAF 10 SSL. The distribution of SVOCs is provided as **Figure 4.0.1-4**. Benzo(a)pyrene concentrations exceeded the PRG within soil borings AOC18SB1, AOC18SB3, and AOC18SB4, with the highest concentration observed at AOC18SB3. Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the PRG within soil borings AOC18SB1 and AOC18SB3, with concentrations of benzo(a)anthracene and benzo(b)fluoranthene also exceeding the DAF 10 SSL in AOC18SB3. Benzo(a)anthracene also exceeds the DAF 10 SSL in AOC18SB1. In general, the highest concentrations of SVOCs within the surface soil were observed within soil boring AOC18SB3.

Metals

Metals were detected in surface soil samples collected for the AOC 18 investigation. Detected concentrations of metals within surface soil were compared to the Region 9 PRGs and DAF 10 SSLs, and the results are presented as **Table 4.15-3**. The concentrations of three metals (arsenic, iron, and manganese) exceeded the PRG, one metal (chromium) exceeded both the PRG and the DAF 10 SSL, and one metal (selenium) exceeded the DAF 10 SSL. The distribution of metals is provided as **Figure 4.0.1-7**. Arsenic concentrations exceeded the PRG at each surface soil sample location except AOC18SB3, with the highest concentration observed at AOC18SB1. Manganese exceeded the PRG at each surface soil samples location except AOC18SB6, with the highest concentration observed at AOC18SB3. Chromium concentrations exceeded the PRG at soil borings AOC18SB2, AOC18SB3, AOC18SB4 and AOC18SB5. Chromium also exceeded the DAF 10 SSL at five of the six surface sampling points (all except for AOC18SB6). . Iron concentrations exceeded the PRG at AOC18SB1 and AOC18SB4. Selenium concentrations exceeded the DAF10 SSL in each soil boring except AOC18SB6 in which selenium was not detected.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the Region 9 PRG and the results are presented as **Table 4.15-4**. Arochlor 1248 was detected in soil borings AOC18SB1 and AOC18SB4, and Arochlor 1254 was detected in only AOC18SB1. The distribution of PCBs is provided as **Figure 4.0.1-10**. The PRG for total PCBs was exceeded only in soil boring AOC18SB1.

Dioxins

Dioxins were detected in the surface soil samples collected from AOC18SB3, AOC18SB5, and AOC18SB6. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH values within the surface soil were compared to the Region 9 PRG, and the

results are presented as **Table 4.15-5**. The distribution of dioxins is provided as **Figure 4.0.1-13**.No dioxins were detected at concentrations exceeding the PRG. Dioxins were found to exceed the ESL in two of three samples.

Cyanide
Surface soil samples collected for the AOC 18 investigation were analyzed for cyanide. Detected concentrations of cyanide were compared to the Region 9 PRG, and the results are presented as **Table 4.15-3**. Cyanide was detected in the surface soil samples collected from AOC18SB1, AOC18SB2, and AOC18SB3. Surface soil detects of cyanide were below the PRG.

4.15.1.2 Subsurface soil

VOCs
VOCs were detected in subsurface soil samples collected for the AOC 18 investigation with the exception of soil boring AOC18SB4. VOCs detected within AOC 18 subsurface soils included benzene, ethylbenzene, toluene and xylenes. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.15-1**. The distribution of VOCs is provided as **Figures 4.0.1-2** and **4.0.1-3.** Subsurface soil detects of VOCs from 2 to 10 ft bgs were below the PRG . A single detection of benzene slightly above the DAF 10 SSL was noted in one sample (AOC18SB1, 2 – 3.6ft) . Subsurface soil detects of VOCs from greater than 10 ft bgs were below all of the screening levels.

SVOCs
SVOCs were detected in the subsurface soil sample collected from AOC18SB1 from 2 to 3.6 ft bgs. SVOCs detected in this sample included various PAHs. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.15-2**.. No SVOCs were detected within subsurface soil sample from greater than 10 ft bgs. The distribution of SVOCs is provided as **Figure s 4.0.1-5** and **4.0.1-6.**. The concentration of benzo(a)pyrene at AOC18SB1 from 2 to 3.6 ft bgs exceeded the PRG.

Metals
Metals were detected in subsurface soil samples collected for the AOC 18 investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.15-3**. The concentrations of four metals (arsenic, chromium, iron, and manganese) exceeded the PRG within the subsurface soil from 2 to 10 ft bgs. No metals were detected at concentrations exceeding the DAF 10 SSL in the subsurface soils from greater than 10 ft bgs. The distribution of metals is provided as **Figures 4.0.1-8** and **4.0.1-9**. Concentrations of arsenic exceeded the PRG within each subsurface sample collected from 2 to 10 ft bgs, with the highest concentration observed within AOC18SB5, which also exceeds the DAF 10 SSL. Iron concentrations exceeded the PRG within soil borings AOC18SB1 and AOC18SB5. Chromium concentrations exceeded the PRG within AOC18SB5. Chromium also exceeded the DAF 10 SSL at AOC18SB4 and AOC18SB5. Manganese concentrations exceeded the PRG within AOC18SB1.

PCBs
Soil PCB results for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.15-4**. The distribution of PCBs is provided as **Figures 4.0.1-11** and **4.0.1-12.** .PCBs were not detected in subsurface soils during the AOC 18 investigation.

Dioxins
Dioxins were not analyzed from subsurface soil samples collected for the AOC 18 investigation.

Cyanide
Subsurface soil samples collected for the AOC 18 investigation were analyzed for cyanide. Cyanide was not detected in any of the subsurface soil samples.

4.15.2 Summary

Surface soil sampling results for AOC 18 indicate that relatively low concentrations of VOCs, SVOCs and metals are present in surface soils, with some SVOCs and metals constituents exceeding the screening criteria, including, slightly elevated SVOC concentrations at AOC18SB3 and elevated concentrations of chromium at AOC18SB3 and AOC18SB5. Field observations indicate the presence of slag within the surface soils. A slightly elevated concentration of total PCBs was also observed within AOC18SB1.

Subsurface soil sampling results indicate that a low concentration of benzo(a)pyrene exceeding the screening criteria was observed from 2 to 10 ft bgs within AOC18SB1, but SVOCs were not detected within subsurface soils throughout the remaining portions of AOC 18 at concentrations exceeding the screening criteria. Low concentrations of metals that exceed the screening criteria are also present within subsurface soil from 2 to 10 ft bgs, with a slightly elevated concentration of chromium at AOC18SB5.

Surface and subsurface soils throughout AOC 18 were observed to be relatively uniform, consisting of slag and fill materials intermixed with sand and gravel to depths ranging from approximately 3 to 13 ft bgs, underlain by silty clay with some gravel. Although chromium concentrations slightly higher than the PRG were observed within native soils at AOC18SB5 from 6 to 8 ft bgs, chromium does not exceed the screening criteria within subsurface soil from 2 to 10 ft bgs at other sample locations and observed concentrations are typically within the range of background concentrations.

As summarized in the analytical tables for AOC 18 (Tables 4.15-1 through 4.15-5), soils at AOC 18 do not indicate historic site activities have caused significant soil impacts. Monitoring wells at the eastern edge of AOC 13 are essentially collocated with a portion of AOC 18, and thus groundwater impacts at this geographic area are evaluated within the groundwater discussion (Section 4.29) and the AOC 13 technical discussion and summary (Section 8.0) rather than within this AOC 18 summary.

4.15.3 Recommendations

No further investigation of AOC 18 is recommended.

4.16 AOC 19 – Former coke oven gas pipeline (off-site)

4.16.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituents at accessible former locations of drip legs, blowoffs and valve pits along AOC 19, the former coke oven gas pipeline (off-site) located to the north of the northern parcel, which had been decommissioned during previous Site cleanup activities. Based on survey coordinates, the locations of the former drip legs, blowoffs and valve pits locations were staked in the field and each area was visually inspected for observations of former COG structures, soil staining or discoloration. No observations of impacts were identified at any of the locations. Based accessibility and safety (the former COG pipeline was located primarily adjacent to railroad tracks and active roadways), a total of 13 soil boring locations were selected and identified as AOC19SB1 through AOC19SB13. One surface sample from 0 to 2 ft bgs was collected from each of the thirteen soil borings. One or more subsurface soil samples from 2 to 8 ft bgs were collected from all thirteen borings. No samples were collected from subsurface soil greater than 10 ft bgs. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

The analytical results for each constituent were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.16-1** through **Table 4.16-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Results are discussed in the following sections. Local background concentrations are also shown in each table for reference purposes.

4.16.1.1 Surface soil

VOCs

VOCs were detected in the surface soil samples collected from soil borings AOC19SB1, AOC19SB2, AOC19SB4, and AOC19SB7 through AOC19SB13. VOCs detected within AOC 19 surface soils included benzene, ethylbenzene, toluene and xylenes. Detected concentrations of VOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.16-1**. The distribution of VOCs is provided as Figure 4.0.1-1. Surface soil detects of VOCs were below the screening criteria.

SVOCs

SVOCs were detected in each surface soil sample collected except soil borings AOC19SB1 and AOC19SB3. SVOCs detected within AOC 19 surface soils included various PAHs. Detected concentrations of SVOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.16-2**. The distribution of SVOCs is provided as **Figure 4.0.1-4**. Benzo(a)pyrene concentrations exceeded the PRG within soil borings AOC19SB2, AOC19SB5, AOC19SB6, AOC19SB8, AOC19SB9, AOC19SB10, and AOC19SB12, with the highest concentration observed at AOC19SB9. Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene exceeded the PRG within one or more soil borings. The DAF 10 SSL was exceeded for two constituents, benzo(a)anthracene and benzo(b)fluoranthene within one (1) surface soil sample

(AOC19SB9). The highest concentrations of SVOCs were observed within the silty clay with gravel and brick materials located in soil boring AOC19SB9.

Metals

Metals were detected in the surface soil samples collected from all soil borings for the AOC 19 investigation. Detected concentrations of metals within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.16-3**. The concentrations of three metals (chromium, iron, and lead) exceeded the PRG, and one metal (arsenic) exceeded both the PRG and the DAF 10 SSL. The distribution of metals is provided as **Figure 4.0.1-7**. Arsenic concentrations exceeded the PRG at each surface soil sample location, with the highest concentration observed at AOC19SB8 where both the PRG and the DAF 10 SSL were exceeded. Chromium, iron, and lead concentrations exceeded the PRG within one or more soil borings. In general, the highest metals concentrations were detected within soil boring AOC19SB9 or AOC19SB13.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the available screening criteria and the results are presented as **Table 4.16-4**. The distribution of PCBs is provided as **Figure 4.0.1-10**. Aroclor 1248 and aroclor 1254 were detected within one (1) soil boring (AOC19SB10); however, the detections were below the respective screening criteria. The calculated total PCB concentration value in AOC19SB10 is above the residential PRG screening value.

Dioxins

Dioxins were detected in the surface soil samples collected from AOC19SB1, AOC19SB3, AOC19SB4, AOC19SB6, AOC19SB7, AOC19SB11, and AOC19SB12. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH values within the surface soil were compared to the Region 9 PRG, and the results are presented as **Table 4.16-5**. The distribution of dioxin TEQ-HH is provided as **Figure 4.0.1-13**. Dioxin TEQ-HH values exceeded the PRG at soil borings AOC19SB1, AOC19SB11, and AOC19SB12. Dioxin TEQ-HH values exceeded the ESL at soil borings AOC19SB6 and AOC19SB7.

Cyanide

Surface soil samples collected for the AOC 19 investigation were laboratory analyzed for cyanide. Detected concentrations of cyanide were compared to the available screening criteria, and the results are presented as **Table 4.16-4**. Cyanide was detected in soil boring AOC19SB11, exceeding the ESL screening value only. The PRG for cyanide was not exceeded in this surface soil sample location.

4.16.1.2 Subsurface soil

VOCs

VOCs were detected in all subsurface soil samples collected except within soil borings AOC19SB6, AOC19SB9, and AOC19SB12. VOCs detected within AOC 19 subsurface soils included benzene, ethylbenzene, toluene and xylenes. Detected concentrations of VOCs for subsurface soil from 2 to 8 ft bgs were compared to the available screening criteria, and the

results are presented as **Table 4.16-1**. Subsurface soil detects of VOCs from 2 to 8 ft bgs were below the screening criteria.

SVOCs

SVOCs were detected in the subsurface soil samples collected from AOC19SB1, AOC19SB3 through AOC19SB5, AOC19SB8 through AOC19SB10, and AOC19SB13. SVOCs detected within AOC 19 subsurface soils included various PAHs. Detected concentrations of SVOCs for subsurface soil from 2 to 8 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.16-2**. The distribution of SVOCs is provided as **Figure 4.0.1-5**. Within subsurface soils from 2 to 8 ft bgs, the concentrations of two PAHs exceeded the PRG. Concentrations of benzo(a)pyrene exceeded the PRG at AOC19SB1, AOC19SB4 and AOC19SB12. Concentrations of dibenz(a,h)anthracene concentrations exceeded the PRG at AOC19SB1. Concentrations of naphthalene exceeded the ESL in AOC19SB4.

Metals

Metals were detected in the subsurface soil samples collected from each soil boring for the AOC 19 investigation. Detected concentrations of metals for subsurface soil from 2 to 8 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.16-3**. The distribution of metals is provided as **Figure 4.0.1-8**. Within subsurface soils from 2 to 8 ft bgs, the concentrations of three metals (arsenic, iron, and manganese) exceeded the PRG, one metal (chromium) exceeded both the PRG and the DAF 10 SSL, and one metal (selenium) exceeded the DAF 10 SSL. Concentrations of arsenic exceeded the PRG within each subsurface soil sample location, with the highest concentration observed within AOC19SB12. Chromium, iron, manganese, and selenium concentrations exceeded the screening level standard within soil boring within one or more boring locations.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 8 ft bgs were compared to the Region 9 PRG, and the results are presented as **Table 4.16-4**. The distribution of PCBs is provided as **Figure 4.0.1-11**. Aroclor 1248 and aroclor 1254 were detected within soil boring AOC19SB10. The PRG for total PCBs was exceeded within soil boring AOC19SB10 from 4 to 6 ft bgs.

Dioxins

Dioxins were detected in the subsurface soil samples collected from AOC19SB2, AOC19SB4, AOC19SB5, AOC19SB7 through AOC19SB10, and AOC19SB13. Dioxin concentrations within the subsurface soil were compared to the Region 9 PRG, and the results are presented as **Table 4.16-5**. The distribution of dioxins is provided as **Figure 4.0.1-14**. Dioxin values exceeded the PRG at soil borings AOC19SB10 and AOC19SB13.

Cyanide

Subsurface soil samples collected for the AOC 19 investigation were laboratory analyzed for cyanide, but cyanide was not detected in any of the samples.

4.16.2 Summary

Surface soil sampling results for AOC 19 indicate that low concentrations of dioxins that exceed the screening criteria are present in surface soils to the south at AOC19SB1 and toward the north at AOC19SB11 and AOC19SB12. Low concentrations of SVOCs exceeding the screening criteria are also present in subsurface soils, with slightly elevated concentrations observed at AOC19SB9. Relatively low concentrations of metals that exceed the screening criteria are present throughout AOC 19 surface soils, with slightly elevated concentrations of chromium observed in AOC19SB9 and AOC19SB13 and an elevated concentration of arsenic in AOC19SB8.
Subsurface soil sampling results indicate that low concentrations of total PCBs and dioxins that exceed the screening criteria are present in the subsurface soils from 2 to 8 ft bgs within the northern portion of AOC 19 at AOC19SB10 and AOC19SB13. Low concentrations of SVOCs that exceed the screening criteria are present within subsurface soils toward the southern portion of AOC 19 in AOC19SB1 and AOC19SB4. Relatively low concentrations of metals exceeding the screening criteria are present throughout AOC 19, with elevated concentrations of chromium observed toward the northern portion at AOC19SB10 and AOC19SB13.

No field observations of surface staining or discoloration was observed at any of the former COG pipeline drip legs, blowoffs and valve pits which had been decommissioned during previous Site cleanup activities. Surface soil and subsurface soils throughout AOC 19 generally consisted of silty clay and sandy clay intermixed with sand and gravel and intermittent fill material. Field observations for AOC19SB4 indicated the presence of slag, coke material and coal within the surface soil, and soils within AOC19SB9 consisted of silty clay from 0 to 1 ft bgs but contained fill, trace slag, brick and glass fragments, and trace wood chips from approximately 1 to 9 ft bgs, underlain by silty clay. Although chromium concentrations slightly higher than the PRG were observed within subsurface native soils at AOC19SB10 and AOC19SB13, field observations did not indicate the presence of staining, slag, or odors. Furthermore, chromium does not exceed the screening criteria within subsurface soil from 2 to 10 ft bgs at other sample locations and observed concentrations are typically within the range of background concentrations.

4.16.3 Recommendations

No further investigation of AOC 19 is recommended.

4.17 AOC 20 – Remaining areas on southern parcel

4.17.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituents at AOC 20, which consists of the remaining areas on the southern parcel of the Site. During the initial RI, a total of 36 soil borings within 13 composite areas identified as AOC20CA1 through AOC20CA13, and 27 borings identified as AOC20SB14 through AOC20SB40 were completed throughout AOC 20. In addition, seven shallow and two intermediate monitoring wells were installed and identified as MW-1S, MW-2S, MW-3S, MW-5S, MW-6S, MW-7S, MW-19S, MW-6M, and MW-7M. For analysis of VOCs, twenty-five discrete soil samples were collected from 0 to 2 ft bgs, 40 soil samples from 2 to 10 ft bgs, and 37 soil samples from greater than 10 ft bgs. Surface and subsurface samples for other analyses were collected as composite samples consisting of soil borings within each composite area and as discrete samples from soil borings AOC20SB14

through AOC20SB40 and the monitoring wells. The analysis of SVOCs, metals, PCBs, dioxins, and cyanide included twenty-two soil samples collected from 0 to 2 ft bgs, 37 soil samples from 2 to 10 ft bgs, and 30 soil samples from greater than 10 ft bgs. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

Based on the results of the initial RI, five additional soil borings and one monitoring well were completed during the 2008 supplemental RI in the southern and eastern sections of AOC 20. The additional investigations were conducted to further evaluate field observations of petroleum and/or tar-like material in previously completed soil borings at the south end of the property. These locations also were chosen to further assess subsurface soil and/or groundwater conditions to provide complete boundary conditions along the eastern side of the property to ensure no data gaps existed for the HHRA and groundwater delineation. Five additional soil borings (AOC20CA4SB3A, AOC20CA4SB3B, AOC20CA4SB4, AOC20CA12SB3, AOC20CA12SB4), and one shallow monitoring well (MW-32S) were completed during the supplemental RI.

The analytical results for soil samples collected and analyzed from both investigations were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.17-1** through **Table 4.17-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Local background concentrations are also shown in each analytical data summary table for reference purposes. Results are discussed in the following sections. A focused figure (Figure 4.30.2-1) depicting the southern portion of AOC 20 and AOC10, as well as portions of AOC 22 is also provided for pertinent sampling results/locations.

Surface soil

VOCs

VOCs were detected in several of the thirty surface soil samples collected for the AOC 20 investigation. VOCs detected within surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs were compared to the available screening criteria, and the results are presented as **Table 4.17-1**. The distribution of the VOC exceedances in surface soil is provided as **Figure 4.0.1-1**. Surface soil concentrations of benzene and methylene chloride exceeded the DAF 10 SSL at AOC20CA9SB2, located to the west of the southern portion of AOC 13. Cyclohexane was also detected in this sample above the ESL. In general, the highest concentrations of VOCs were detected in AOC20CA9SB2 in which a petroleum odor in the surface soil sample was noted in the field observations. Several other VOCs were detected in other surface soil samples, including acetone, 2-butanone, carbon disulfide, methylcyclohexane, methylene chloride, ethylbenzene, tetrachloroethene, toluene, and xylenes. Each of the other constituent detections were below the screening criteria in each sample.

SVOCs

SVOCs were detected in several of the twenty six surface soil samples collected for the AOC 20 investigation. Detected concentrations of SVOCs were compared to the available screening criteria, and the results are presented as **Table 4.17-2**. The concentrations of several SVOCs exceeded the PRG in more than one soil sample, including, benzo(a)anthracene, benzo(a)pyrene benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

A small number of SVOCs (benzo(a)anthracene, benzo(a)pyrene benzo(b)fluoranthene) exceeded both the PRG and the DAF 10 SSL. The distribution of benzo(a)pyrene exceedances in surface soil is provided as **Figure 4.0.1-4**. Benzo(a)pyrene concentrations exceeded the PRG in surface soil sample locations in a majority of samples (except AOC20SB39, AOC20CA12, and MW-6S), with the highest concentrations detected at AOC20CA8 and AOC20SB40 in which the DAF 10 SSL was also exceeded. In addition, benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene exceeded both the PRG and the DAF 10 SSL at one or more surface soil sample locations. Concentrations of benzo(k)fluoranthene and indeno(1,2,3-c,d)pyrene exceeded the PRG at one or more surface soil sample locations, and carbazole exceeded the DAF 10 SSL in AOC20CA8 and AOC20SB40. In general the highest concentrations of SVOCs were detected within AOC20CA8, which is located to the southwest of AOC 13, and within AOC20SB40, which is located to the northeast of AOC 13. Field observations indicated slag material to be present at these boring locations.

Metals

Metals were detected in surface soil samples collected for the AOC 20 investigation. Detected concentrations of metals were compared to the available screening criteria, and the results are presented as **Table 4.17-3**. The concentrations of four metals exceeded the PRG, one metal exceeded both the PRG and the DAF 10 SSL, and two metals exceeded the DAF 10 SSL. The distribution of arsenic and chromium exceedances in soil is provided as **Figure 4.0.1-7**. Arsenic concentrations exceeded the PRG at surface soil sample locations except AOC20CA4 and MW-19S, with the highest concentration detected at MW-6S. Chromium was detected in each surface soil sample location, with concentrations exceeding the PRG at 12 locations and exceeding both the PRG and the DAF 10 SSL at 17 locations; the highest chromium concentration was detected at MW-6S (132 mg/kg). Field observations noted coarse slag and fill materials within the surface soils at MW-6S. Iron, lead, and manganese concentrations also exceeded the PRG and nickel and selenium concentrations exceeded the DAF10 SSL at one or more soil boring locations.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the Region 9 PRG and the results are presented as **Table 4.17-4**. Aroclor 1248, aroclor 1254, and aroclor 1260 were detected at one or more surface soil sample locations. The distribution of total PCB exceedances is provided as **Figure 4.0.1-10**. Total PCB concentrations exceeded the total PCB PRG at surface soil sample locations AOC20CA1, AOC20CA5, AOC20CA7, AOC20CA8, AOC20CA10, AOC20SB40, and MW-5S, with the highest concentration observed at AOC20CA1 (1,740 ug/kg).

Dioxins

Dioxins were detected in surface soil samples at AOC20CA1, AOC20CA4, AOC20CA7, MW-1S, MW-5S, and MW-19S. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH concentrations were compared to the Region 9 PRG, and the results are presented as **Table 4.17-5**. The distribution of dioxin TEQ-HH is provided as **Figure 4.0.1-13**. The PRG for dioxin TEQ-HH was exceeded at surface soil sample locations AOC20CA1, AOC20CA7, and MW-5S within the southern portion of the southern parcel. The dioxin TEQ-HH was also exceeded in sample AOC22RA18 collected from the adjacent Riparian Area.

Cyanide
Cyanide was detected in low concentrations in several surface soil samples collected for the AOC 20 investigation. Detected concentrations of cyanide were compared to the Region 9 PRG, and the results are presented as **Table 4.17-3**. Surface soil detections of cyanide were all below the available screening criteria.

4.17.1.1 Subsurface soil

VOCs
VOCs were detected in subsurface soil samples collected for the AOC 20 investigation. VOCs detected within subsurface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.17-1**. The distribution of VOC exceedances in soils is provided as **Figure 4.0.1-2 (**2 to 10 ft bgs) and **Figure 4.0.1-3 (**greater than 10 ft bgs**).** Within the subsurface soil from 2 to 10 ft bgs, benzene was detected above the DAF 10 SSL in one soil sample from MW-1S. Within subsurface soil greater than 10 ft bgs, the benzene concentration at AOC20CA3SB2 and the methylene chloride concentrations at AOC20CA9SB2 and AOC20CA10SB2 exceeded the DAF 10 SSL. Black staining and petroleum odors were observed within AOC20CA10SB2 from approximately 18 to 24 ft bgs. A petroleum odor was indicated at the sample interval in AOC20CA3SB2.

SVOCs
SVOCs were detected in subsurface soil samples collected for the AOC 20 investigation. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.17-2**. The distribution of benzo(a)pyrene exceedances in soil is provided as **Figure 4.0.1-5 (**2 to 10 ft bgs) and **Figure 4.0.1-6 (**greater than 10 ft bgs**).**

Within subsurface soil from 2 to 10 ft bgs, benzo(a)pyrene concentrations exceeded the PRG within several soil samples and also exceeded the DAF 10 SSL in several samples. In general, the highest concentrations of SVOCs were detected at MW-1S from 8 to 10 ft bgs. Elevated concentrations of SVOCs were also detected within AOC20CA4 from 5 to 10 ft bgs.

Within subsurface soil greater than 10 ft bgs, benzo(a)anthracene concentrations at MW-1S and AOC20CA12 and the concentration of carbazole at MW-1S exceeded the DAF 10 SSL. A slight odor and some staining were noted in the field observations for MW-1S from subsurface soils greater than approximately 18 ft bgs. Although field observations for AOC20CA12 noted fill material with a sheen from 0 to 2 ft bgs, and slag with a sulfur odor from 2 to 4 ft bgs, no staining or odors were indicated within subsurface soils greater than 10 ft bgs.

Several SVOC detections above one or more of the screening criteria were indicated in eight subsurface soil samples analyzed from the supplemental RI. Detections include benzo(a)anthracene, benzo(a)pyrene benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene, above the PRG and/or the DAF 10 SSL in one or more samples. Higher detections were noted in samples collected from AOC20CA4SB4 which were associated with a thin product-containing (tar-like material) layer observed during completion of the soil boring.

Metals

Metals were detected in subsurface soil samples collected for the AOC 20 investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.17-3**. The distribution of arsenic and chromium exceedances in soil is provided as **Figure 4.0.1-8** (2 to 10 ft bgs) and **Figure 4.0.1-9** (greater than 10 ft bgs).

Within subsurface soil from 2 to 10 ft bgs, arsenic concentrations exceeded the PRG at each sample location, with the highest concentration detected at AOC20SB14 .The DAF 10 SSL was also exceeded for arsenic in 11 subsurface samples. The chromium concentration detected within MW-1S, AOC20SB16 and AOC20SB38 exceeded both the PRG and the DAF 10 SSL. Chromium exceeded the DAF 10 SSL in seven soil samples. At one or more sampling locations, aluminum, iron, and manganese concentrations exceeded the PRG, and selenium exceeded the DAF 10 SSL.

Within subsurface soil greater than 10 ft bgs, the chromium concentration at AOC20SB16 and the selenium concentration within AOC20CA13 exceeded the DAF 10 SSL.

No significant metals constituent detections were indicated in the subsurface soil samples analyzed from the supplemental RI.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.17-4**. Aroclor 1260 was detected in multiple samples within subsurface soil from 2 to 10 ft bgs and subsurface soil greater than 10 ft bgs. The distribution of total PCB exceedances is provided as **Figure 4.0.1-11** (2 to 10 ft bgs) and **Figure 4.0.1-12** (greater than 10 ft bgs). Within subsurface soils from 2 to 10 ft bgs, the PRG for total PCBs was exceeded within soil borings AOC20CA5, AOC20SB22, AOC20SB33, and AOC20SB34. Aroclor 1260 was detected within soil boring AOC20SB16 (10-10.6 ft bgs) above the ESL, which is located to the east of AOC 14 (the former transformer and compressor area).

Dioxins

Dioxins were detected in subsurface soil samples collected for the AOC 20 investigation. Dioxin concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.17-5**. The distribution of dioxin exceedances is provided as **Figure 4.0.1-14** and **Figure 4.0.1-15.** Within subsurface soil from 2 to 10 ft bgs, the ESL was exceeded in eight samples. Within subsurface soil from greater than 10 ft bgs, the ESL was exceeded in three samples.

Cyanide

Cyanide was detected in seven subsurface soil samples collected for the AOC 20 investigation. Cyanide concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.17-3**. Subsurface soil detections of cyanide were all below the available screening criteria.

4.17.2 Summary

Surface soil sampling results for AOC 20 indicate that low concentrations of VOCs, PCBs, and dioxins that exceed the screening criteria are present in surface soils. Benzene and methylene chloride exceeded the screening criteria within AOC20CA9SB2, which is located to the west of the southern portion of AOC 13 and is likely related to impacts from this area. Slightly elevated concentrations of PCBs and dioxins that exceeded the screening criteria were observed at various locations throughout the southern parcel, with a slightly elevated concentration observed at AOC20CA1 in the southwest portion of the site in the vicinity of the former ore yard.

Low concentrations of SVOCs exceeding the screening criteria are present throughout the surface soils of AOC 20, with slightly higher concentrations of SVOCs observed in AOC20CA8 and AOC20SB40. AOC20CA8 and AOC20SB40 are located to the southwest and northeast of AOC 13, respectively.

Relatively low concentrations of metals that exceed the screening criteria are present throughout the surface soils of AOC 20, with elevated concentrations observed at various locations throughout AOC 20 at MW-6S, AOC20CA1, AOC20CA12, and AOC20SB40. Elevated concentrations of metals correspond to field observations of slag and fill materials, some with a metallic sheen (AOC20CA12) and some with coal pieces (AOC20CA1). In particular, chromium was detected at elevated concentrations above the DAF 10 SSL at multiple surface and subsurface sample locations throughout AOC 20.

Subsurface soil sampling results indicate that lower concentrations of VOCs, PCBs, and dioxins that exceed the screening criteria are present in subsurface soils. Low concentrations of VOCs were detected above the screening criteria to the west and north of AOC 13 at soil borings AOC20CA9SB2 and AOC20CA10SB2, respectively, and to the west of AOC 8 at soil boring AOC20CA3SB2. PCBs were generally detected at low concentrations, but an elevated concentration was detected at AOC20SB16, which is located to the east of AOC 14.

Relatively low concentrations of SVOCs that exceed the screening criteria are present in subsurface soils from 2 to 10 ft bgs throughout the majority of AOC 20, but highly elevated concentrations were observed within the southern portion of the site at MW-1S and AOC20CA4, which are located in the vicinity of AOC 10. Concentrations of SVOCs, including naphthalene, were higher than the DAF 10 at these locations. SVOC impacts do not extend beyond 10 ft bgs as SVOC concentrations within subsurface soils greater than 10 ft bgs were generally low with only slightly elevated concentrations at MW-1S and at AOC20CA12 to the southwest of AOC 13.

Relatively low concentrations of metals that exceed the screening criteria are present in subsurface soils, with slightly elevated concentrations detected near AOC 10 in the southern portion of the site and near AOC 13 and AOC 14 within the central portion of the Site. Arsenic, chromium, and iron were detected at comparatively higher concentrations within MW-1S from 8 to 10 ft bgs, and arsenic and chromium were detected at relatively high concentrations within AOC20SB14 from 6 to 6.8 ft bgs and AOC20SB16 from 10 to 12 ft bgs, respectively, which are located in the vicinity of AOC 13 and AOC 14. Metal concentrations do not appear to extend significantly beyond 10 ft bgs as metals within subsurface soils greater than 10 ft bgs were generally detected at lower concentrations.

In general, low concentrations of SVOCs and metals are widespread throughout the entirety of AOC 20 within surface soils, which generally consist of slag and fill materials, and subsurface soils from 2 to 10 ft bgs, with higher concentrations observed adjacent to AOCs 10, 13 and 14.

Focused investigations completed at the south end of AOC20 during the Supplemental RI indicated the presence of a subsurface product/tar-like material within three soil borings (AOC20CA4SB3A, AOC20CA4SB3B, and AOC20CA4SB4). Within AOC20CA4SB3A, a sand with metallic sheen and a tar-like material with creosote-like odor was observed at an approximate depth of 11.5 to 12 feet bgs, and additional tar-like material was observed at 13.8 to approximately 16 feet bgs. Within AOC20CA4SB3B, several discrete layers of product/ tar-like material were observed from a depth of 17.8 to approximately 21.5 feet bgs. Within AOC20CA4SB4, a moist zone and black gravel material with strong naphthalene odor was noted at a depth of approximately 10 feet bgs, and a black sand with 2-inch layer of tar-like material was observed at 14.5 feet bgs.

Each of these soil borings were completed within approximately 120 to 150 feet of one another at the south end of AOC20. Two of the soil borings (AOC20CA4SB3B, and AOC20CA4SB4) were completed adjacent to AOC10. Each of the soil borings were completed near the edge of the property above where the break in ground slope extends into the Riparian Area. **Figure 4.30.2-1** provides a close-up view of the boring locations, along with the locations of borings completed during the initial RI.

Several soil borings were completed during the initial RI within AOC10 that also encountered soil staining, petroleum odors, or a black material at varying depths ranging from 8 to 18 feet bgs. The locations of these borings also appear in the figure. It is noted also, that, small deposits of a tar material have been observed in the Riparian Area in the vicinity of the soil borings. Some inference can be made, that if the surface tar material deposits in the Riparian Area are not isolated deposits from small container disposal on the ground surface, then potential exists for the deposits to be connected with the subsurface materials observed in the borings.

Measurements for separate phase product were made on September 30, 2008 from available monitoring wells located in this portion of the site. Field measurements were obtained using an oil/water interface probe to detect the presence of either floating LNAPL or sinking DNAPL within wells. No LNAPL or DNAPL was indicated by the probe in any monitoring well.

4.17.3 Recommendations

No further investigation of AOC20 is considered necessary at this time respective to assessment needs for the RI Report. It is anticipated that additional groundwater sampling and checks for LNAPL and DNAPL will occur using an interface probe in support of the FS.

4.18 AOC 21 – Remaining areas on northern parcel

4.18.1 Soil sampling and analysis

Soil sampling activities were conducted in AOC21 during the initial RI to assess the nature and extent of constituents in the remaining areas on the northern parcel of the Site. A total of 13 soil borings were completed and were identified as AOC21SB1 through AOC21SB13. In addition, two shallow and one intermediate monitoring wells were installed and identified as MW-14S, MW-15S,

and MW14M. Surface samples were collected at AOC21SB1 through AOC21SB13, MW-14S, and MW15S from 0 to 2 ft bgs. Subsurface soil samples were collected at AOC21SB1 through AOC21SB13, MW-14S, and MW15S from 2 to 10 ft bgs. One or more subsurface soil samples were collected at all soil borings from greater than 10 ft bgs. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

The analytical results for soil samples collected and analyzed from AOC21 were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.18-1** through **Table 4.18-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.2-1** through **Figure 4.0.2-15**. Results are discussed in the following sections. Local background concentrations are also shown in each analytical data summary table for reference purposes.

4.18.1.1 Surface soil

VOCs

VOCs were detected in low concentrations in surface soil samples collected for the AOC 21 investigation. VOCs detected within surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs were compared to the available screening criteria, and the results are presented as **Table 4.18-1**. Detected concentrations of VOCs within surface soils were below the screening criteria. The distribution of the VOC exceedances in surface soil is provided as **Figure 4.0.2-1**.

SVOCs

SVOCs were detected low concentrations in surface soil samples AOC21SB1, AOC21SB2, AOC21SB9, AOC21SB10, and AOC21SB11. Detected concentrations of SVOCs were compared to the available screening criteria, and the results are presented as **Table 4.18-2**. The distributions of SVOC compounds are provided as **Figure 4.0.2-4**. Detected concentrations of SVOCs within surface soils were below the screening criteria.

Metals

Metals were detected in surface soil samples collected for the AOC 21 investigation. Detected concentrations of metals were compared to the available screening criteria, and the results are presented as **Table 4.18-3**. The concentrations of several metals constituents were found to exceed one or more of the screening criteria. These metals include: antimony, arsenic, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, thallium, vanadium, and zinc. The distribution of metals compounds are provided as **Figure 4.0.2-7**. Arsenic concentrations exceeded the screening criteria at each surface sample locations.

PCBs

PCB results are presented as **Table 4.18-4**. PCBs were not detected in any of the surface soil samples.

Dioxins

Dioxins were detected in surface soil samples AOC21SB1, AOC21SB3, AOC21SB5, and AOC21SB8. Statistical analysis was performed on analytical data for dioxins to calculate

representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH concentrations were compared to the Region 9 PRG, and the results are presented as **Table 4.18-5**. Surface soil dioxin and dioxin TEQ-HH concentrations were indicated to be above the ESL in one of the four samples (AOC21SB1).

Cyanide

Cyanide was not detected in surface soil samples collected for the AOC 21 investigation.

4.18.1.2 Subsurface soil

VOCs

VOCs were detected in low concentrations in subsurface soil samples collected for the AOC 21 investigation. VOCs detected within subsurface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.18-1**. Subsurface soil detects of VOCs were below the screening criteria. The distribution of the VOC exceedances in subsurface soil is provided as **Figure 4.0.2-2** and **Figure 4.0.2-3**.

SVOCs

SVOCs were detected in low concentrations in subsurface soil samples collected from AOC21SB2, AOC21SB6, and AOC21SB7. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.18-2**. The distributions of benzo(a)pyrene and dibenz(a,h)anthracene, selected as indicator compounds, are provided as **Figure 4.0.2-5** and **Figure 4.0.2-6**, respectively. Subsurface soil detections of benzo(a)pyrene, dibenz(a,h)anthracene, and naphthalene from 2 to 10 ft bgs in AOC21SB2, and benzo(a)pyrene from greater than 10 ft bgs in AOC21SB2 exceeded the PRG and/or the ESL. Subsurface soil detections of benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and naphthalene from 2 to 10 ft bgs in AOC21SB6 also exceeded the PRG and/or the ESL. None of the subsurface soil detects exceeded the DAF 10 SSL.

Metals

Metals were detected in subsurface soil samples collected for the AOC 21 investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.18-3**. The distribution of metals compounds are provided as **Figure 4.0.2-8** and **Figure 4.0.2-9**, respectively. Arsenic was found to exceed the PRG and/or the DAF 10 SSL in multiple samples. Vanadium was found to exceed the ESL in multiple samples.

PCBs

PCB results are presented as **Table 4.18-4**. PCBs were not detected in any of the subsurface soil samples.

Dioxins

Dioxins were detected in subsurface soil samples AOC21SB2, AOC21SB4, AOC21SB6, AOC21SB7, AOC21SB8, AOC21SB9, AOC21SB10, AOC21SB11, MW-14S, MW-14M and MW-15S. Dioxin concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the Region 9 PRG and the results are presented as **Table 4.18-5**. Several

individual constituent detections were observed in one sample (AOC21SB2) exceeding the individual ESLs.

Cyanide
Cyanide was not detected in subsurface soil samples collected for the AOC 21 investigation.

4.18.2 Summary

PCBs and cyanide were not detected in AOC 21. Metals (arsenic, chromium and iron) were the only constituents that exceeded the PRG at surface soil samples in AOC 21. Metals (arsenic, vanadium) exceeded the PRG, DAF 10 SSL, or ESL in multiple subsurface soil samples in AOC 21. Low level dioxin concentrations were observed to be above the ESL in selected surface and subsurface soil samples.

4.18.3 Recommendations

No further investigation of AOC21 is recommended.

4.19 Block A – Former slag processing area

4.19.1 Soil sampling and analysis

Soil sampling activities were conducted during the initial RI investigations to assess the nature and extent of constituents at Block A, the former slag processing area, located in the northern parcel of the Site. A total of 58 soil borings were completed within 13 composite areas identified as BACA1 through BACA13. In addition, two shallow and one intermediate monitoring wells were installed and identified as MW-13S, MW-18S, and MW-13M. No additional environmental sampling, other than monitoring well groundwater sampling was conducted in Block A during the supplemental RI.

During the initial RI, surface and subsurface samples were collected for analysis of VOCs from one or more individual soil borings within each composite area, and from monitoring well borings MW-13S and MW-18S. Surface and subsurface samples for other analyses were collected as composite samples of soil borings within each composite area, and from monitoring well borings MW-13S and MW-18S. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

The analytical results for soil samples collected and analyzed from Block A were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.19-1** through **Table 4.19-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.2-1** through **Figure 4.0.2-15**. Local background concentrations are also shown in each analytical data summary table for reference purposes. Results are discussed in the following sections. Local background concentrations are also shown in each figure for reference purposes.

4.19.1.1 Surface soil

VOCs

VOCs were detected in surface soil samples collected for the Block A investigation. VOCs detected within surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs were compared to the available screening criteria, and the results are presented as **Table 4.19-1**. The distribution of the VOC exceedances in surface soil is provided as **Figure 4.0.2-1**. Surface soil concentrations above one or more screening criteria were observed in two soil samples, BACA2SB1 (0-1.8 ft) and BACA7SB4 (1.7-2 ft). In sample BACA2SB1, detections of benzene (23 J ug/kg) and 1,2-dichloroethane (0.46 J ug/kg) were noted above the DAF 10 SSL and ESL, respectively. In sample BACA7SB4, detections of benzene (25,000 ug/kg), carbon disulfide (1,200 J ug/kg), ethylbenzene (56,000 ug/kg), xylenes (total, 440,000 ug/kg), styrene (120,000 ug/kg), and toluene (190,000 ug/kg) were noted above one or more screening criteria. Benzene was detected above the PRG, DAF 10 SSL and ESL. Carbon disulfide exceeded the ESL only. Remaining COCs exceeded the DAF 10 SSL and ESL.

SVOCs

SVOCs were detected in surface soil samples collected for the Block A investigation except from BACA3 and BACA13. Detected concentrations of SVOCs were compared to the available screening criteria, and the results are presented as **Table 4.19-2**. The distribution of benzo(a)pyrene exceedances in soils is provided as **Figure 4.0.2-4**. The concentrations of six SVOCs exceeded the PRG, and two SVOCs exceeded the DAF 10 SSL. Benzo(a)pyrene concentrations exceeded the PRG in each soil boring except BACA3 and BACA13. In addition, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene exceeded the PRG at one or more soil boring locations. Concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, and dibenzo(a,h)anthracene exceeded both the PRG and DAF10 SSL in monitoring well soil boring MW-13S. Concentrations of benzo(k)fluoranthene and indeno(1,2,3-c,d)pyrene also exceeded the PRG in this boring sample., and concentrations of chrysene exceeded the ESL.

Metals

Metals were detected in surface soil samples collected for the Block A investigation. Detected concentrations of metals were compared to the available screening criteria, and the results are presented as **Table 4.19-3**. The distribution of arsenic exceedances in soil is provided as **Figure 4.0.2-7**. The concentrations of five metals exceeded the PRG and three metals exceeded the DAF 10 SSL. Arsenic concentrations exceeded the PRG at several soil boring locations. Chromium (total), iron, manganese, and vanadium concentrations also exceeded the PRG at one or more soil boring locations. Cadmium, chromium (total), and selenium concentrations exceeded the DAF10 SSL at one or more soil boring locations.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the Region 9 PRG and the results are presented as **Table 4.19-4**. Aroclor 1248 and aroclor 1260 were detected in surface soil samples at BACA12 and BACA8, respectively. However, PCB and total PCB concentrations were below the PRG.

Dioxins
Dioxins were detected in surface soil samples at BACA1, BACA4, BACA7, BACA10, MW-13S, and MW-18S. One or more dioxin/furan COCs were detected above the ESL. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin TEQ-HH concentrations were compared to the Region 9 PRG, and the results are presented as **Table 4.19-5**. Dioxin TEQ-HH concentrations were above the PRG in one sample (MW-13S). Several individual dioxin detections and dioxin TEQ-HH concentrations were above the ESL in each sample.

Cyanide
Cyanide was detected in surface soil samples collected for the Block A investigation, except BACA10 through BACA13. Detected concentrations of cyanide were compared to the Region 9 PRG and ESL, and the results are presented as **Table 4.19-3**. Surface soil detections of cyanide were below the PRG; however, surface soil detections of cyanide were above the ESL in eight soil samples, with concentrations ranging from 1.43 ug/kg (BACA5) to 4.02 ug/kg (MW-18S).

4.19.1.2 Subsurface soil

VOCs
VOCs were detected in subsurface soil samples collected for the Block A investigation. VOCs detected within subsurface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.19-1**. The distribution of the VOC exceedances in subsurface soil is provided as **Figure 4.0.2-2** and **Figure 4.0.2-3**. Trichloroethene exceeded both the PRG and DAF 10 SSL at sample location BACA9B4 (65 ug/kg, 4-6ft bgs). All remaining subsurface soil concentrations of VOCs were below the screening criteria.

SVOCs
SVOCs were detected in subsurface soil samples collected for the Block A investigation. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.19-2**. The distribution of the SVOC exceedances in subsurface soil is provided as **Figure 4.0.2-5** and **Figure 4.0.2-6**. Concentrations of SVOCs that exceeded the PRG were observed in composite area samples from BACA5 and BACA7. Benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, dibenzo(a,h)anthracene was detected above the PRG in sample BACA5. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and dibenzo(a,h)anthracene was detected above the PRG and DAF 10 SSL in BACA7. The other subsurface soil detects of SVOCs were below the PRG and DAF 10 SSL. Indeno(1,2,3-c,d)pyrene was also detected in BACA7 only above the PRG.

Metals
Metals were detected in subsurface soil samples collected for the Block A investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.19-3**. The distribution of the metals exceedances in subsurface soil is provided as **Figure 4.0.2-8** and **Figure 4.0.2-9**. At one or more soil boring locations arsenic, chromium (total), iron, and manganese concentrations exceeded the PRG, and chromium (total) and selenium

concentrations exceeded the DAF 10 SSL and the ESL in selected samples from 2 to 10 ft bgs. Concentrations of metals detected in samples below 10 ft bgs were below screening criteria, except for some COCs (cadmium, lead, manganese, selenium, vanadium) with exceedances of the ESL indicated.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.19-4**. The distribution of the PCB exceedances in subsurface soil is provided as **Figure 4.0.2-11** and **Figure 4.0.2-12**... Concentrations of PCBs and total PCBs were not detected in subsurface soil from greater than 10 ft bgs. Arochlor 1248 was detected in composite area sample BACA12; however, the concentration was below the PRG and ESL.

Dioxins

Dioxins were detected in subsurface soil samples from BACA2, BACA3, BACA5, BACA6, BACA9, and BACA12. One or more dioxin/furan COCs were detected above the ESL. Dioxin concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.19-5**. The distribution of the dioxin exceedances in subsurface soil is provided as **Figure 4.0.2-14** and **Figure 4.0.2-15**. Subsurface soil detections of dioxin were below the PRG but above the ESL for selected few compounds in relatively few samples.

Cyanide

Cyanide was detected in subsurface soil samples collected for the Block A investigation. Cyanide concentrations for subsurface soil from 2 to 10 ft bgs were compared to the Region 9 PRG, and the results are presented as **Table 4.19-3.** Concentrations of cyanide were not detected in subsurface soil from greater than 10 ft bgs. Subsurface soil detects of cyanide were below the PRG; however, detections of cyanide were above the ESL in eight soil samples, with concentrations ranging from 1.39 (BACA6) to 5.14 ug/kg (BACA3).

4.19.2 Summary

Surface soil sampling results for Block A indicate that low concentrations of VOCs (in boring BACA7SB4 only) SVOCs and metals that exceed the screening criteria are present in surface soils. PCBs, dioxins and cyanide were not detected above the screening criteria except for occasional detections above the ESL. VOCs (BTEX) that exceeded the screening criteria were observed in soil boring BACA7SB4. Slag fill materials were observed in surface soils throughout Block A.

Subsurface soil sampling results indicate that concentrations of VOCs, SVOCs, and metals that exceed the screening criteria are present in subsurface soils between 2 and 10 feet. There were no exceedances of the screening criteria below 10 feet, except for trichloroethene, which was detected above the screening level within silty clay material observed in soil boring BACA9SB4 from 4 to 6 ft bgs. PCBs, dioxins and cyanide were not detected above the screening criteria. SVOCs and metals exceeding the screening criteria in subsurface soil from 2 to 10 ft bgs were

observed in both native soils and fill materials. However, SVOCs exceeding the screening levels were limited to composite areas BACA5 and BACA7.

In addition, VOC, SVOC and metals detected in Block A were not detected above the MCL within groundwater in the vicinity of Block A.

4.19.3 Recommendations

No further investigation of Block A is recommended.

4.20 Block B – Former sinter plant production area

4.20.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituent at Block B, the former sinter plant production area located in the southern portion of the southern parcel of the Site. A total of 8 soil borings were completed and were identified as BBSB1 through BBSB8. Soil samples were also collected during the installation of monitoring well MW-22S, which was included as part of Block B. One surface sample from 0 to 2 ft bgs was collected from all eight soil borings and from MW-22S. One subsurface soil sample from 2 to 10 ft bgs was collected from the eight soil borings. One subsurface soil sample from greater than 10 ft bgs was collected from all eight soil borings, and two subsurface soil samples from greater than 10 ft bgs were collected from MW-22S. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

In addition to the above sampling, which was completed during the initial RI, one additional surface soil sample was collected in the vicinity of Block B during the supplemental RI. This sample was obtained from surficial soil in the riparian area, and designated AOC22RA18. This sample was submitted for the same suite of analyses as the above samples. Results for this nearby sample are discussed within the AOC22 subsection of this report.

The analytical results for soil samples collected and analyzed from Block B were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.20-1** through **Table 4.20-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Local background concentrations are also shown in each table for reference purposes. Results are discussed in the following sections.

4.20.1.1 Surface soil

VOCs

VOCs were detected in surface soil samples collected for the Block B investigation with the exception of MW-22S. VOCs detected within Block B surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.20-1**. The distribution of the VOC exceedances in surface soil is provided as **Figure 4.0.1-1**. Surface soil detections of VOCs were below the available screening criteria in Block B.

SVOCs

SVOCs were detected in surface soil samples collected for the Block B investigation. SVOCs detected within Block B surface soils included various PAHs and other SVOCs, including four PAHs that were consistently detected in nine surface soil sampling locations. Detected concentrations of SVOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.20-2**. The concentrations of five PAHs exceeded the PRG, one PAH exceeded both the PRG and the DAF 10 SSL, and one SVOC exceeded the DAF 10 SSL.

The distribution of the SVOC exceedances in surface soil is provided as **Figure 4.0.1-4**. Benzo(a)pyrene concentrations exceeded the PRG in each soil boring except BBSB2, with the highest concentration observed at BBSB4. Dibenz(a,h)anthracene concentrations exceeded the PRG in soil borings BBSB1, BBSB4, BBSB6, and BBSB7, with the highest concentration observed at BBSB4. Concentrations of benzo(a)anthracene, benzo(k)fluoranthene and carbazole exceeded the screening criteria in one or more soil borings, with the highest concentration observed at BBSB6. Concentrations of benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene exceeded the screening criteria within one or more soil borings, with the highest concentration observed at BBSB4.

Metals

Metals were detected in surface soil samples collected for the Block B investigation. Detected concentrations of metals within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.20-3**. The concentrations of two metals (iron and manganese) exceeded the PRG, two metals (arsenic and chromium) exceeded both the PRG and the DAF 10 SSL, and two metals (antimony and selenium) exceeded the DAF 10 SSL. The distribution of the metals detections are provided as **Figure 4.0.1-7**. Arsenic concentrations exceeded the PRG at each surface soil sample location, with the highest concentration observed at BBSB3 in which the DAF 10 SSL was also exceeded. Concentrations of antimony exceeded the DAF 10 SSL at each surface soil sample location except MW-22S, with the highest concentration observed at BBSB3. Iron concentrations exceeded the PRG within five surface soil sample locations and manganese concentrations exceeded the PRG within eight surface soil sample locations, each with the highest concentration observed at BBSB3. Chromium concentrations exceeded the PRG at BBSB3 and BBSB5 and exceeded both the PRG and the DAF 10 SSL at BBSB1 and BBSB4. Selenium concentrations exceeded the DAF 10 SSL in five soil borings, with the highest concentration observed at BBSB1.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the available screening criteria and the results are presented as **Table 4.20-4**. Aroclor 1248, aroclor 1254, and aroclor 1260 were detected within various soil samples. In surface soil samples, detections of arochlor 1248 were noted in samples BBSB1, BBSB3, and BBSB6. Arochlor 1254 was detected in BBSB1 (3,300 ug/kg, the only single COC detection above the PRG) and in BBSB7. Arochlor 1260 was detected in samples BBSB3, BBSB4, BBSB5, BBSB6, BBSB8, MW-22S, and AOC22RA18. The distribution of total PCBs is provided as **Figure 4.0.1-10**. The PRG for total PCBs was exceeded within soil borings BBSB1, BBSB3, BBSB4, BBSB5, BBSB6 , BBSB8 and MW-22S. The highest total PCB value was detected at BBSB1 (0-2 ft bgs, 8,050 ug/kg).

Dioxins

Dioxins were detected in the surface soil samples collected from BBSB1, BBSB4, and BBSB8. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH values within the surface soil were compared to the available screening criteria, and the results are presented as **Table 4.20-5**. The distribution of dioxin TEQ-HH is provided as **Figure 4.0.1-13**. The PRG and ESL for dioxin TEQ-HH was exceeded within soil borings BBSB1, BBSB4, and BBSB8. The highest TEQ-HH value was observed at BBSB1 (33.397 ng/kg). The concentration of 2,3,7,8-TCDD within soil boring BBSB1 (5.561 ng/kg) also exceeded the PRG and ESL.

Cyanide

Surface soil samples collected for the Block B investigation were laboratory analyzed for cyanide. Detected concentrations of cyanide were compared to the available screening criteria, and the results are presented as **Table 4.20-3**. Cyanide was detected in each surface soil sample collected with the exception of BBSB3 and BBSB5. The concentrations of cyanide were below the PRG; however, five cyanide detections were noted to be above the ESL (BBSB1, BBSB2, BBSB4, BBSB8, and MW-22S) with detections ranging from 1.50 to 8.55 ug/kg. The distribution of cyanide is provided as **Figure 4.0.1-7**.

4.20.1.2 Subsurface soil

VOCs

VOCs were detected in subsurface soil samples collected for the Block B investigation. VOCs detected within Block B subsurface soils included primarily petroleum VOCs as well as chlorinated and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.20-1**. The distribution of the VOC exceedances in subsurface soil is provided as **Figure 4.0.1-2** and **Figure 4.0.1-3**. Subsurface soil detections of VOCs from 2 to 10 ft bgs and depths greater than 10 ft bgs were below the PRG and DAF 10 SSL.

SVOCs

SVOCs were detected in subsurface soil samples from 2 to 10 ft bgs collected for the Block B investigation with the exception of BBSB7. SVOCs were also detected in the subsurface soil samples from greater than 10 ft bgs collected from soil borings BBSB4, BBSB6, BBSB8, and MW-22S from 12.5 to 15 ft bgs. SVOCs detected within Block B subsurface soils included various PAHs and other SVOCs. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.20-2**. The distribution of the SVOC exceedances in subsurface soil is provided as **Figure 4.0.1-5** and **Figure 4.0.1-6**. Within subsurface soils from 2 to 10 ft bgs, the concentrations of two SVOCs exceeded the PRG, four SVOCs exceeded both the PRG and the DAF 10 SSL, and one SVOC exceeded the DAF 10 SSL. The detected concentrations of SVOCs within subsurface soil from greater than 10 ft bgs were below the DAF 10 SSL.

Concentrations of benzo(a)pyrene exceeded the PRG within each subsurface soil sample collected from 2 to 10 ft bgs except BBSB7. The highest concentration of benzo(a)pyrene was observed at BBSB2, in which the DAF 10 SSL was also exceeded. Dibenz(a,h)anthracene concentrations exceeded the PRG within five of the eight subsurface soil samples collected from 2 to 10 ft bgs, with the highest concentration observed at BBSB2, in which the DAF 10 SSL was

also exceeded. In general, the highest SVOC concentrations detected within the subsurface soil samples collected from 2 to 10 ft bgs were observed within soil boring BBSB2.

Metals

Metals were detected in subsurface soil samples collected for the Block B investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.20-3**. The distribution of the metals exceedances in subsurface soil is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. Within subsurface soils from 2 to 10 ft bgs, the concentrations of three metals (arsenic, iron, and manganese) exceeded the PRG, one metal (chromium) exceeded both the PRG and the DAF 10 SSL, and two metals (antimony and selenium) exceeded the DAF 10 SSL. Within subsurface soils from greater than 10 ft bgs the concentrations of two metals (antimony and selenium) exceeded the DAF 10 SSL.

Arsenic concentrations exceeded the PRG within each subsurface soil sample from 2 to 10 ft bgs with the highest concentration observed at BBSB2. Antimony concentrations exceeded the DAF 10 SSL within each subsurface soil sample from 2 to 10 ft bgs except BBSB5, and within each subsurface soil sample from greater than 10 ft bgs except MW-22S. The highest antimony concentrations were observed at BBSB from 4 to 4.6 ft bgs and at BBSB8 from 16 to 17.1 ft bgs. Chromium, iron, and selenium concentrations exceeded the screening criteria at one or more soil sample locations, with the highest concentration detected at BBSB6. Manganese concentrations also exceeded the screening criteria at more than one soil sample location, with the highest concentration detected within BBSB2.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.20-4**. The distribution of the metals exceedances in subsurface soil is provided as **Figure 4.0.1-11** and **Figure 4.0.1-12**. No PCBs were detected within the subsurface soil samples from greater than 10 ft bgs. Aroclor 1254 was detected in soil boring BBSB1 (4-5.2ft bgs, 84 ug/kg), which is below the PRG. All individual PCB and total PCB concentrations within subsurface soil sample locations were below the PRG and ESL.

Dioxins

Dioxins were detected in subsurface soil samples from 2 to 10 ft bgs within soil boring BBSB2 and from subsurface soil samples from greater than 10 ft bgs within soil borings BBSB3 and MW-22S. Dioxin concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.20-5**. The distribution of dioxin exceedances in subsurface soil is provided as **Figure 4.0.1-14** and **Figure 4.0.1-15**. The ESL for several dioxin COCs was exceeded within soil boring sample BBSB2. Subsurface soil detections of dioxins were below the PRG.

Cyanide

Subsurface soil samples collected for the Block B investigation were laboratory analyzed for cyanide. Detected concentrations of cyanide for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are

presented as **Table 4.20-3**. The distribution of cyanide is provided as **Figure 4.0.1-11** and **Figure 4.0.1-12**. Cyanide was detected in the 2 to 10 ft bgs subsurface soil sample from BBSB4, exceeding the ESL but not the PRG. Cyanide was also detected in the greater than 10 ft bgs subsurface soil sample collected from BBSB6, also exceeding the ESL but not the PRG. Cyanide was detected in MW-1S in the 2008 sampling event at a concentraction of 8130 ug/L, above the MCL.

4.20.2 Summary

Surface soil sampling results for Block B indicate that low concentrations of dioxins and PCBs that exceed the screening criteria are present in surface soils within the central portion of Block B at BBSB1, BBSB4 and BBSB8, with the highest concentration of total PCBs detected at BBSB1. Relatively low concentrations of SVOCs that exceed the screening criteria are present throughout the majority of the surface soils within Block B, with slightly elevated concentrations located within the central and southern portions of Block B at BBSB4, BBSB6 and BBSB7. Field observations for Block B indicate the presence of slag. Relatively low concentrations of metals exceeding the screening criteria are present throughout the majority of Block B, with higher concentrations of metals present primarily within BBSB3, and to a lesser extent within BBSB1 and BBSB4. Slag and fill materials were observed within BBSB4. Field observations indicated no slag, odors or staining within BBSB1 or BBSB3.

Subsurface soil sampling results indicate that lower concentrations of SVOCs that exceed the screening criteria are present in subsurface soils throughout Block B. Slightly elevated concentrations of SVOCs are present within the northern portion of Block B at BBSB2. Relatively low concentrations of metals exceeding the screening criteria are also present throughout the subsurface soils of Block B, with slightly elevated concentrations detected within BBSB2 and BBSB6. Field observations at these locations indicate the presence of slag and fill materials. Elevated concentrations of metals are generally limited to a depth of approximately 10 ft bgs, with the exception of antimony concentrations that exceed the DAF in subsurface soils greater than 10 ft bgs within Block B soil borings. Selenium also exceeded the screening criteria within BBSB7 at a depth of 14 to 14.9 ft bgs.

Surface and subsurface soils throughout Block B were observed to be relatively uniform, generally consisting of sand and gravel with some slag and fill materials to depths ranging from 4 ft bgs to as deep as 10 ft bgs, underlain by silty clay intermixed with some sand and gravel. The extent of SVOC and metal impacts appears to be vertically defined to soils less than 10 ft bgs, with the exception of antimony. Antimony concentrations slightly higher than the DAF were observed in surface, subsurface soils from 2 to 10 ft bgs and subsurface soils greater than 10 ft bgs. However antimony does not appear to be leaching to groundwater since antimony was not detected within any monitoring wells in the vicinity of Block B, including MW-1S, MW-1D, MW-4S, and MW-4M to the south, MW-2S and MW-2D to the southeast, and MW-3S and MW-3D to the east.

No significant soil VOC detections were noted within Block B samples. A subsurface soil sample detection of benzene was noted in MW-1S (8-10 ft bgs, 27 ug/kg). No significant groundwater VOC detections have been observed in monitoring wells MW-1S or MW-22S, adjacent to and within the Block B investigation area, respectively. Several SVOCs, with naphthalene being the most elevated at 110 ug/L, have been detected in MW-1S in December 2005 sampling and analysis. These detections were not repeated in the June 2008 sampling and analysis. However, the June 2008 sampling of monitoring well MW-1S detected cyanide in this well at a concentration

of 8130 ug/L, which exceeds the cyanide MCL. Cyanide analysis of the MW-1D sample indicated no detection above the laboratory method detection limit of 0.005 ug/L. Detections of cyanide in MW-22S, MW-4S and MW-2S were all well below the MCL. Wells MW-4M and MW-2D cyanide concentrations were reported as below 0.005 ug/L.

4.20.3 Recommendations

No further investigation of Block B is recommended for purposes of the RI. It is anticipated that additional groundwater monitoring will occur as the Site CERCLA evaluation proceeds to conduct of an FS.

4.21 Block C – Former blast furnace production area

4.21.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituents at Block C, the former blast furnace production area located in the southern portion of the southern parcel of the Site. A total of 16 soil borings were completed and were identified as BCSB1 through BCSB16. Surface samples from 0 to 2 ft bgs were collected from soil borings BCSB1 through BCSB3 and BCSB5 through BCSB13. Subsurface soil samples from 2 to 10 ft bgs were collected from soil borings BCSB3 through BCSB9 and BCSB11 through BCSB13. One or more subsurface soil samples from greater than 10 ft bgs were collected from the sixteen soil borings. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

The analytical results for soil samples collected and analyzed from Block C were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.21-1** through **Table 4.21-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Local background concentrations are also shown in each table for reference purposes. Results are discussed in the following sections. Local background concentrations are also shown in each figure for reference purposes.

4.21.1.1 Surface soil

VOCs

VOCs were detected in surface soil samples collected for the Block C investigation. VOCs detected within Block C surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.21-1**. The distribution of VOC exceedances in surface soil is provided as **Figure 4.0.1-1**. Surface soil detects of VOCs were below the screening criteria.

SVOCs

SVOCs were detected in surface soil samples collected for the Block C investigation. SVOCs detected within Block C surface soils included various PAHs and other SVOCs, including twelve PAHs that were detected in each surface soil sampling location. Detected concentrations of

SVOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.21-2**. The distribution of SVOC exceedances in surface soil is provided as **Figure 4.0.1-4**. The concentrations of one PAH exceeded the PRG, five PAHs exceeded both the PRG and the DAF 10 SSL, and one SVOC exceeded the DAF 10 SSL.

Benzo(a)pyrene and dibenz(a,h)anthracene concentrations exceeded the PRG in each surface soil sample, with the highest concentration observed at BCSB12 in which the concentration also exceeded the DAF 10 SSL. Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, and indeno(1,2,3-cd)pyrene exceeded the PRG and/or DAF 10 SSL screening criteria in one or more soil sample locations. In general, the highest surface soil SVOC concentrations were detected in soil boring BCSB12. Field observations indicated that slag and fill materials were present in BCSB12 surface soils.

Metals

Metals were detected in surface soil samples collected for the Block C investigation including thirteen metals that were detected in each surface soil sampling location. Detected concentrations of metals within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.21-3**. The distribution of metals detections is provided as **Figure 4.0.1-7**. The concentrations of five metals (aluminum, iron, lead, manganese, and vanadium) exceeded the PRG, two metals (arsenic and chromium) exceeded both the PRG and the DAF 10 SSL, and three metals (antimony, cadmium, and selenium) exceeded the DAF 10 SSL.

Arsenic concentrations exceeded the PRG at each surface soil sample location except BCSB1, with the highest concentration observed at BCSB9 in which the DAF 10 SSL was also exceeded. Iron concentrations exceeded the PRG at each surface soil sample location, with the highest concentration observed at soil boring BCSB12. Selenium concentrations exceeded the DAF10 SSL in soil borings BCSB1, BCSB2, and BCSB5, with the highest concentration observed at BCSB5.

Manganese and chromium concentrations exceeded the PRG, DAF 10 SSL, and/or the ESL screening criteria at multiple soil sample locations, with the highest concentration observed at BCSB13. Aluminum, lead, vanadium, antimony, and cadmium concentrations each exceeded the screening criteria at only one or two surface soil sample locations.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the available screening criteria and the results are presented as **Table 4.21-4**. The distribution of total PCBs is provided as **Figure 4.0.1-10**. Aroclor 1260 was detected within each surface soil sample location with the exception of BCSB1, BCSB4 and BCSB12. None of the individual arochlor detections exceeded the screening criteria. The total PCB PRG was exceeded within seven of the surface soil samples, with concentrations ranging from 232.5 ug/kg (BCSB3) to 2,800 ug/kg (BCSB6).

Dioxins

Dioxins were detected in the surface soil samples collected from BCSB1, BCSB3, BCSB8, and BCSB13. Statistical analysis was performed on analytical data for dioxins to calculate

representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH values within the surface soil were compared to the available screening criteria, and the results are presented as **Table 4.21-5**. The distribution of dioxin TEQ-HH is provided as **Figure 4.0.1-13**. Several individual constituent detections were found to exceed individual ESL values in each soil sample. The PRG for dioxin TEQ-HH was exceeded within soil borings BCSB8 and BCSB13, with the highest value observed at BCSB13 (9.8588 ng/kg). The ESL for dioxin TEQ-HH was exceeded within each of the four soil samples.

Cyanide

Surface soil samples collected for the Block C investigation were laboratory analyzed for cyanide. Detected concentrations of cyanide were compared to the available screening criteria, and the results are presented as **Table 4.21-3**. The distribution of cyanide is provided as **Figure 4.0.1-7**. Cyanide was detected in twelve of thirteen surface soil sample collected. Concentrations of cyanide in surface soil were all below the PRG. Concentrations of cyanide in surface soil were all above the ESL in the twelve samples.

4.21.1.2 Subsurface soil

VOCs

VOCs were detected in subsurface soil samples collected for the Block C investigation. VOCs detected within Block C subsurface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.21-1**. The distribution of VOCs is provided as **Figure 4.0.1-2** and **Figure 4.0.1-3**. Subsurface soil detects of VOCs from 2 to 10 ft bgs and from greater than 10 ft bgs were below the screening criteria.

SVOCs

SVOCs were detected in the subsurface soil samples from 2 to 10 ft bgs collected from soil borings BCSB3, BCSB4, BCSB7, BCSB8, BCSB9, and BCSB12, and SVOCs were detected in the subsurface soil samples from greater than 10 ft bgs that were collected from soil borings BCSB1, BCSB2, BCSB7, and BCSB14. SVOCs detected within Block C subsurface soils included various PAHs and other SVOCs. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.21-2**. The distribution of SVOCs is provided as **Figure 4.0.1-5** and **Figure 4.0.1-6**. Within subsurface soils from 2 to 10 ft bgs, the concentrations of one PAH exceeded the PRG, five PAHs exceeded both the PRG and the DAF 10 SSL, and one SVOC exceeded the DAF 10 SSL. SVOC concentrations within subsurface soil from greater than 10 ft bgs were below the DAF 10 SSL.

Concentrations of benzo(a)pyrene exceeded the PRG in each subsurface soil sample collected from 2 to 10 ft bgs, with the highest concentration observed at BCSB12, in which the DAF 10 SSL was also exceeded. Concentrations of benzo(a)anthracene,benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, dibenz(a,h)anthracene, and indeno(1,2,3 cd) pyrene exceeded one or more or the screening criteria, including the DAF 10 SSL at soil boring BCSB12. SVOC were also detected above one or more of the screening criteria in borings BCSB7 and BCSB8. In general, the highest SVOC concentrations detected within the subsurface

soil samples collected from 2 to 10 ft bgs were observed within the slag and fill materials located in soil boring BCSB12, in which rust staining was indicated in the field observations.

Metals

Metals were detected in subsurface soil samples collected for the Block C investigation, including fourteen metals that were detected in each subsurface soil sampling location. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.21-3**. The distribution of metals is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. Within subsurface soils from 2 to 10 ft bgs, the concentrations of two metals (iron and manganese) exceeded the PRG, two metals (arsenic and chromium) exceeded both the PRG and the DAF 10 SSL, and one metal (cadmium) exceeded the DAF 10 SSL. Within subsurface soil from greater than 10 ft bgs one metal (selenium) exceeded the DAF 10 SSL.

Arsenic concentrations exceeded the PRG within ten subsurface soil samples from 2 to 10 ft bgs, with the highest concentration observed at BCSB12 in which the DAF 10 SSL was also exceeded. Iron concentrations exceeded the PRG at surface soil sample locations BCSB3, BCSB6, BCSB8, and BCSB11 through BCSB13, with the highest concentration observed at soil boring BCSB13. No arsenic or iron detects within subsurface soil greater than 10 ft bgs exceeded the DAF 10 SSL. Selenium concentrations within the subsurface from 2 to 10 ft bgs were below both the PRG and the DAF 10 SSL, but exceeded the DAF 10 SSL within the subsurface from greater than 10 ft bgs at soil boring BCSB1. Several metals constituents, including arsenic, cadmium, lead, manganese, selenium, vanadium and zinc exceeded the ESL in one or more subsurface samples.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.21-4**. The distribution of PCBs is provided as **Figure 4.0.1-11** and **Figure 4.0.1-12**. Aroclor 1260 was detected in soil samples from 2 to 10 ft bgs in borings BCSB3, BCSB7, BCSB11, BCSB12 and BCS13. None of the individual arochlor detections exceeded the screening criteria. The total PCB PRG value was exceeded within soil borings BCSB3, BCSB7, BCSB11 and BCSB12, with concentrations ranging from 223.5 ug/kg (BCSB12) to 2,000 ug/kg (BCSB11).. No PCBs were detected within the subsurface soil samples from greater than 10 ft bgs.

Dioxins

Dioxins were detected in subsurface soil samples from 2 to 10 ft bgs within soil borings BCSB7, BCSB9, and BCSB11, and from subsurface soil samples greater than 10 ft bgs within soil borings BCSB12 and BCSB14. Dioxin concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.21-5**. The distribution of dioxins is provided as **Figure 4.0.1-14** and **Figure 4.0.1-15**. Several individual constituent detections were found to exceed individual ESL values in soil samples analyzed from BCSB7, BCSB9, and BCSB11. Within subsurface soil from 2 to 10 ft bgs, the PRG for dioxin TEQ-HH was exceeded in the BCSB7, BCSB9, and BCSB11 samples. No individual constituent screening criteria were exceeded in the two samples analyzed from deeper than 10 ft bgs (BCSB12 and BCSB14).

Cyanide

Subsurface soil samples collected for the Block C investigation were analyzed for cyanide. Detected concentrations of cyanide for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.21-3**. The distribution of cyanide is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. Cyanide was detected in four subsurface soil samples from 2 to 10 ft bgs (BCSB6 , BCSB7, BCSB8, BCSB11, and BCSB12) exceeding the ESL, but not exceeding the PRG. Cyanide was not detected within the subsurface samples from greater than 10 ft bgs.

4.21.2 Summary

Surface soil sampling results for Block C indicate that low concentrations of SVOC, metals, cyanide total PCB and total dioxin TEQ-HH exceed one or more screening criteria in surface soils. Relatively low concentrations of SVOCs that exceed the screening criteria were observed throughout Block C, but higher concentrations of SVOCs were observed in soil boring BCSB12 near the center of the eastern edge of Block C. Metal concentrations that exceed the screening criteria were also observed throughout surface soils of Block C, especially in soil borings BCSB5, BCSB9, BCSB11, BCSB12, and BCSB13, which are located along the central portion and eastern edge of the Block C boundary. In particular, concentrations of chromium were elevated within these soil sample locations. Low concentrations of cyanide were noted above the ESL in several samples. Slightly elevated concentrations of total PCBs exceeding the screening criteria are present to a limited extent within the surface soils of Block C. Total dioxin values exceeded the PRG or ESL in more than one sample.

Subsurface soil sampling results indicate that low concentrations of dioxins and slightly elevated concentrations of PCBs that exceed the screening criteria are present to a limited extent in subsurface soils from 2 to 10 ft bgs. Relatively low concentrations of SVOCs exceeding the screening criteria are present in the subsurface soils within the central portion of Block C at BCSB7 and BCSB8, and higher concentrations of SVOCs that exceed the screening criteria are present within subsurface soils at BCSB12 near the center of the eastern edge of Block C. Elevated SVOC concentrations in these locations correspond to field observations of slag throughout, as well as coal-like material and a sulfur odor in BCSB8, phased product in BCSB7, and rust staining with a slight odor in BCSB12. Metals concentrations that exceed the screening criteria are also present throughout Block C within the subsurface soils but are particularly elevated within the central portion and along the eastern boundary. Elevated concentrations of metals are generally limited to a depth of approximately 10 ft bgs, with the exception of selenium concentrations that exceeded the DAF within soil boring BCSB1 from 14 to 16 ft bgs.

Surface and subsurface soils throughout Block C were observed to be relatively uniform, consisting of slag and fill materials intermixed with concrete and brick to depths ranging from approximately 10 to 25 ft bgs. The vertical extent of SVOC and metal impacts does not appear to extend beyond a depth of approximately 10 ft bgs.

4.21.3 Recommendations

No further investigation of Block C is recommended.

4.22 Block D – Former railroad repair area

4.22.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituents at Block D, the former railroad repair area, located in the southern parcel of the Site. A total of 8 soil borings were completed during the initial RI investigation and were identified as BDSB1 through BDSB8. Surface samples were collected at BDSB2, BDSB3, and BDSB5 through BDSB8 from 0 to 2 ft bgs. Subsurface soil samples were collected at BDSB1 through BDSB4 and BDSB6 through BDSB8 from 2 to 10 ft bgs. One or more subsurface soil samples were collected at soil borings from greater than 10 ft bgs. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

Additional soil sampling was completed during the supplemental RI, including two additional soil borings (BDSB9 and BDSB10) and one monitoring well (MW-26S). Soil sampling for VOCs, SVOCs, metals, PCBs and cyanide was completed during this additional assessment.

The analytical results for soil samples collected and analyzed from Block D were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.22-1** through **Table 4.22-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Results are discussed in the following sections. Local background concentrations are also shown in each figure for reference purposes.

4.22.1.1 Surface soil

VOCs

VOCs were detected in low concentrations in surface soil samples collected for the Block D investigation except for surface samples from BDSB4 and BDSB9. VOCs detected within surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs were compared to the available screening criteria, and the results are presented as **Table 4.22-1.** The distribution of VOC exceedances in surface soil is provided as **Figure 4.0.1-1**. Detected concentrations of VOCs within surface soils were below the available screening criteria.

SVOCs

SVOCs were detected in surface soil samples collected for the Block D investigation, except the sample from BDSB4. Detected concentrations of SVOCs were compared to the available screening criteria, and the results are presented as **Table 4.22-2**. The concentrations of three SVOCs exceeded the PRG, one SVOC exceeded the DAF 10 SSL and three SVOCs exceeded both the PRG and the DAF 10 SSL. The distribution of VOC exceedances in surface soil is provided as **Figure 4.0.1-4**. Benzo(a)pyrene concentrations exceeded the PRG in all soil borings except BDSB4 and exceeded the DAF 10 SSL at BDSB1. In addition, benzo(a)anthracene concentrations exceeded both the PRG and DAF10 SSL in soil borings BDSB1, BDSB6 and BDSB7. Benzo(b)fluoranthene concentrations exceeded the PRG and DAF10 SSL in BDSB1. Benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene concentrations exceeded the PRG at more than one location.

Metals

Metals were detected in surface soil samples collected for the Block D investigation, except the sample from BDSB4. Detected concentrations of metals were compared to the available screening criteria, and the results are presented as **Table 4.22-3**. The distribution of metals detections is provided as **Figure 4.0.1-7**. The concentrations of two metals exceeded the PRG and two metals exceeded the DAF 10 SSL. Arsenic concentrations exceeded the PRG at each surface sample location, except BDSB4, and exceeded the DAF 10 SSL at BDSB2. Chromium (total) concentrations exceeded the PRG at BDSB1 and BDSB8, and exceeded the DAF 10 SSL at BDSB2, BDSB5 through BDSB7. Iron and manganese concentrations also exceeded the PRG at one or more soil sample locations.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the available screening criteria and the results are presented as **Table 4.22-4**. The distribution of total PCBs is provided as **Figure 4.0.1-10.** Aroclor 1260 was detected in surface soil samples at BDSB1, BDSB2, and BDSB5 through BDSB8. Total PCB concentrations exceeded the PRG in six surface soil samples collected from borings BDSB1, BDSB2, BDSB5 , BDSB6, BDSB7 and BDSB8, with concentrations ranging from 229 ug/kg (BDSB&) to 3440 ug/kg (BDSB8).

Dioxins

Dioxins were detected in surface soil samples at BDSB2, BDSB5, and BDSB8. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH concentrations were compared to the available screening criteria, and the results are presented as **Table 4.22-5.** The distribution of dioxin TEQ-HH is provided as **Figure 4.0.1-13**. The dioxin TEQ-HH concentrations for BDSB2 and BDSB8 exceeded the PRG and the ESL. The dioxin TEQ-HH concentrations for BDSB5 exceeded the ESL.

Cyanide

Cyanide was detected in surface soil samples collected at BDSB1, BDSB2, BDSB3, BDSB5 and BDSB8, for the Block D investigation, except BDSB8. Detected concentrations of cyanide were compared to the available screening criteria, and the results are presented as **Table 4.22-3**. The distribution of cyanide is provided as **Figure 4.0.1-7**. Surface soil detects of cyanide were all below the PRG. Six soil sample detections were, however, above the ESL in borings BDSB1, BDSB2, BDSB3, BDSB5 , BDSB6, and BDSB8.

4.22.1.2 Subsurface soil

VOCs

VOCs were detected in subsurface soil samples collected for the Block D investigation. VOCs detected within subsurface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.22-1**. The distribution of VOCs is provided as **Figure 4.0.1-2** and **Figure 4.0.1-3**. Subsurface soil detects of VOCs from 2 to 10 ft bgs and from greater than 10 ft bgs were below the screening criteria.

SVOCs

SVOCs were detected in subsurface soil samples collected for Block D investigation except BDSB1. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.22-2**. The distribution of SVOCs is provided as **Figure 4.0.1-5** and **Figure 4.0.1-6**.

Concentrations of benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and dibenz(a,h)anthracene in one or more samples collected from 2 to 10 ft bgs exceeded the PRG. The concentration of benzo(a)anthracene collected from 2 to 10 ft bgs at soil boring BDSB2 exceeded both the PRG and DAF 10 SSL. Concentrations of acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluorene and indeno(1,2,3-cd)pyrene exceeded the DAF 10 SSL in the sample collected from 16 to 17 ft bgs from BDSB7.

Metals

Metals were detected in subsurface soil samples collected for the Block D investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.22-3**. The distribution of metals is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. At one or more soil boring locations arsenic, iron, and manganese concentrations exceeded the PRG, and selenium concentrations exceeded the DAF 10 SSL and/or the ESL from 2 to 10 ft bgs. Concentrations of selenium exceeded the DAF 10 SSL in samples taken from greater than 10 ft bgs at soil borings BDSB3, BDSB4 and BDSB6. Concentrations of vanadium exceeded the DAF 10 SSL and/or the ESL in samples taken from greater than 10 ft bgs and from greater than 10 ft bgs at one or more soil boring locations.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.22-4**. The distribution of PCBs is provided as **Figure 4.0.1-11** and **Figure 4.0.1-12**. Aroclor 1260 was detected in subsurface soil samples at BDSB2 only (52 ug/kg). Individual PCB and total PCB concentrations were below the screening criteria.

Dioxins

Dioxins were detected in soil samples from 2 to 10 ft bgs at soil boring BDSB4. Dioxin concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.22-5**. The distribution of dioxins is provided as **Figure 4.0.1-14** and **Figure 4.0.1-15**. Several individual constituent concentrations were above the ESL.

Cyanide

Cyanide was detected in one subsurface soil sample collected from 2 to 10 ft bgs at soil boring BDSB6 for the Block D investigation. Cyanide concentrations for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the

results are presented as **Table 4.22-3**. The distribution of cyanide is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. The subsurface soil detect of cyanide was below the screening criteria.

4.22.1.3 Soil saturation assessment

Concentrations of VOCs and SVOCs were compared to Region 9 CSat values during the initial RI. Chrysene was detected above C_{SAT} values in soil borings BDSB1 and BDSB. Acenaphthene, anthracene, chrysene, dibenzofuran, fluorene and pyrene were detected above C_{SAT} values in soil boring BDSB7. All VOC concentrations were detected below their respective C_{SAT} values.

Separate phased product was observed in soil samples collected from borings BDSB2, BDSB3, BDSB7 and BDSB8 at depths of 16 to 18 feet bgs and BDSB6 at a depth of 2 to 4 feet. The separate phased product was characterized as free product and oily sheen/petroleum product on the boring logs. No additional separate phase product detections were observed in soil borings BDSB9 and BDSB10, completed during the 2008 supplemental RI. It is noted, however, that a moderate petroleum hydrocarbon odor was noted at the water table interface (17 ft depth) in BDSB10. Low to moderate soil headspace concentrations (<100 ppmv) were also noted throughout the vertical extent of both borings, with a high concentration at the BDSB1017 ft depth sample. No separate phase product was indicated within the MW-26S well boring, also completed during the supplemental RI. A slight petroleum hydrocarbon odor was noted at the water table depth (17 ft bgs) in this boring as well.

4.22.2 Summary

Surface soil sampling results for Block D indicate that low concentrations of PCBs and dioxins and concentrations of SVOCs and metals that exceed the screening criteria are present in surface soil fill materials.

Subsurface soil sampling results indicate that concentrations of SVOCs and metals that exceed the screening criteria are present in subsurface soils. The highest concentrations of SVOCs were detected in soil boring BDSB7. Field observations of include a strong odor in BDSB1 from 16 to 18 ft bgs, phased product in BDSB2 from 16.5 to 18 ft bgs, a petroleum odor in BDSB3 from 16 to 18 ft bgs and phased product from 18 to 20 ft bgs, an odor in BDSB4 from 16.5 to 22 ft bgs, a petroleum odor in BDSB6 from 16.9 to 19 ft bgs, phased product and a strong odor in BDSB7 from 16 to 18 ft bgs, an oily sheen and petroleum odor in BDSB8 from 16 to 18 ft bgs, and petroleum and phased product from 18 to 20 ft bgs. Concentrations of VOCs were detected below screening criteria in the subsurface samples collected from these borings, with the exception of BDSB7.

Additional sampling completed during the 2008 supplemental RI, confirmed the presence of probable petroleum hydrocarbon materials in soil near the water table interface based on odor encountered in boring BDSB10 at approximately 17 feet below ground surface. However, no separate phase NAPL has been indicated in any wells located in the vicinity of Block D.

4.22.3 Recommendations

No further investigation of Block D is recommended at this time other than recommended continued groundwater monitoring from wells MW-25S and MW-26S, which are located southeast and west of Block D.

4.23 Block E – Former quenching station area

4.23.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituents at Block E, the former quenching station area located in the central portion of the southern parcel of the Site. A total of 9 soil borings were completed and were identified as BESB1 through BESB9. One surface sample from 0 to 2 ft bgs was collected from each soil boring. One subsurface soil sample from 2 to 10 ft bgs was collected from soil borings BFSB2 and BFSB4 through BFSB6. One or more subsurface soil samples from greater than 10 ft bgs were collected from soil borings BFSB4 through BFSB9. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values. A geophysical survey was also performed in Block E. The purpose of the geophysical survey was to identify subsurface anomalies that may represent buried structures and/or preferential migration pathways. Based on the geophysical results, proposed sampling locations were altered to take into consideration the subsurface anomalies or preferential pathways.

The analytical results for soil samples collected and analyzed from Block E were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.23-1** through **Table 4.23-5**. The distribution of analytical results for detectable constituents is indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Results are discussed in the following sections. Local background concentrations are also shown on each figure for reference purposes.

4.23.1.1 Surface soil

VOCs

VOCs were detected in surface soil samples collected for the Block E investigation. VOCs detected within Block E surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.23-1**. The distribution of VOC exceedances in surface soil is provided as **Figure 4.0.1-1**. Surface soil detects of VOCs were below the screening criteria.

SVOCs

SVOCs were detected in surface soil samples collected for the Block E investigation. SVOCs detected within Block E surface soils included various PAHs. Detected concentrations of SVOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.23-2**. The distribution of SVOC exceedances in surface soil is provided as **Figure 4.0.1-4**. Benzo(a)pyrene concentrations exceeded the residential PRG within BESB1, and BESB3 through BESB6, with the highest concentration observed at BESB4. Dibenz(a,h)anthracene also exceeded the PRG at BESB1.

Metals

Metals were detected in the surface soil samples collected from all soil borings for the Block E investigation. Detected concentrations of metals within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.23-3**. The distribution of

metals detections is provided as **Figure 4.0.1-7**. The concentrations of three metals exceeded the PRG. Arsenic concentrations exceeded the PRG at each surface soil sample location, with the highest concentrations observed at BESB1 and BESB8. Chromium exceeded the PRG and ESL at BESB5. Iron exceeded the residential PRG at BESB5 and BESB7. Lead and vanadium exceeded the ESL at each sampling location.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the available screening criteria and the results are presented as **Table 4.23-4**. The distribution of PCB detections is provided as **Figure 4.0.1-10**. Aroclor 1248, aroclor 1254, and aroclor 1260 were detected within one or more soil boring samples. Individual PCB and total PCB concentrations were below the screening criteria.

Dioxins

Dioxins were detected in the surface soil samples collected from BESB1, BESB8, and BESB9. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin and dioxin TEQ-HH values within the surface soil were compared to the available screening criteria and the results are presented as **Table 4.23-5**. The distribution of dioxin TEQ-HH is provided as **Figure 4.0.1-13**. Surface soil detects of dioxin TEQ-HH were below the PRG. Several of the individual dioxin constituent detections, as well as the TEQ-HH value in each sample, exceeded the ESL in each of the three (3) surface soil samples analyzed.

Cyanide

Cyanide was not detected in surface soils during the Block E investigation.

4.23.1.2 Subsurface soil

VOCs

VOCs were detected in subsurface soil samples collected from the soil borings for the Block E investigation. VOCs detected within Block E subsurface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.23-1**. The distribution of VOCs is provided as **Figure 4.0.1-2** and **Figure 4.0.1-3**. Subsurface soil detects of VOCs from 2 to 10 ft bgs and from greater than 10 ft bgs were below the screening criteria.

SVOCs

SVOCs were detected in subsurface soil samples collected for the Block E investigation. SVOCs detected within Block E subsurface soils included various PAHs and other SVOCs. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.23-2**. The distribution of SVOCs is provided as **Figure 4.0.1-5** and **Figure 4.0.1-6**. Within subsurface soils from 2 to 10 ft bgs, the concentrations of five PAHs exceeded the PRG, and one PAH exceeded both the PRG and DAF. Concentrations of benzo(a)pyrene within subsurface soil from 2 to 10 ft bgs exceeded the PRG at soil borings BESB2, BESB4, and BESB6. Benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and

indeno(1,2,3-cd)pyrene exceeded the screening criteria within subsurface soil from 2 to 10 ft bgs at one or more soil sample locations. Within subsurface soil greater than 10 ft bgs, naphthalene was detected at a concentration below the DAF. Benzo(a)pyrene quantitation limits were elevated in some samples. Benzo(a)pyrene was detected at 13-23 ft bgs at 370 ug/kg, above the industrial PRG only in boring BESB1. Naphthalene was only detected in BESB4, at a depth of 5-6 ft bgs, at 600 ug/kg, below the industrial PRG and DAF 10 screening criteria.

Metals

Metals were detected in the subsurface soil samples collected from all soil borings for the Block E investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.23-3**. The distribution of metals is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. Concentrations of arsenic exceeded the PRG within subsurface soil sample locations from 2 to 10 ft bgs at each soil boring and greater than 10 feet, with the highest concentration detected at BESB4. Lead and manganese were detected above the ESL in several samples. Vanadium was detected above the ESL in each soil sample.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.23-4**. The distribution of PCBs is provided as **Figure 4.0.1-11** and **Figure 4.0.1-12**. Aroclor 1248 and aroclor 1260 were detected in soil borings BESB1 and BESB2. Individual PCB concentrations at each sample location were below the screening criteria. Total PCB concentrations were above the PRG and ESL at locations BESB1 and BESB2.

Dioxins

Dioxins were detected in the sample of subsurface soil from 2 to 10 ft bgs collected from BESB2, and from the subsurface soil samples greater than 10 ft bgs collected from soil borings BESB4 through BESB6. . Dioxin concentrations within the subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.23-5**. The distribution of dioxins is provided as **Figure 4.0.1-14** and **Figure 4.0.1-15**. The concentration of dioxin at BESB2, BESB3 and BESB5 exceeded the ESL for several constituents but did not exceed the residential PRG.

Cyanide

Cyanide was not detected in subsurface soils during the Block E investigation.

4.23.2 Geophysical results

Block E consists of a former quenching station area located within the south parcel of the Site approximately 1,800 ft south of Augspurger Road. The survey area was approximately 0.55 acres in size and consisted of grass covered terrain with moderate (<10 ft) relief. There was no evidence of above-ground metallic interference within the survey area at the time of data collection.

EM-61 Differential Response

A total of 2,246 EM-61 data points were collected on August 25, 2005. Data points were collected along profiles oriented parallel to the long axis of the AOC in a northeast-southwest direction and spaced approximately 5-ft apart. Differential response values, measured in mV, were calculated by taking the difference between the time-decay response values of the top and bottom coils of the instrument. Differential response values ranged from -300 to 900 mV.

The Kriged differential response data were contoured and output is shown in Figure 4.23.2-1B. Colored definition was applied to the output to highlight negative (blue shading; <-25 mV) and positive (red shading; >100 mV) differential response as a means of visualizing metallic anomalies. Elevated differential responses with respect to background response (green shading) are concentrated in the southwest, northeast, and central regions of the survey area (see high amplitude anomaly located in center of ring-shaped structure). The anomalies vary in both size and orientation and those anomalies located to the southwest and northeast likely extend beyond the lateral limits of the survey area.

EM-31 Response

A total of 2,390 EM-31 data points were collected on August 25, 2005. Similar to EM-61, data points were collected along profiles oriented along the length of the AOC in a northeast-southwest direction and spaced approximately 5-ft apart. EM-31 readings collected at each location included both ground conductivity (mS/m) and magnetic susceptibility (ppt) data. The Kriged ground conductivity and magnetic susceptibility data were contoured and output is presented in Figures 4.23.2-1C and 4.23.2-1D. As with the EM-61 data, color enhancement was applied to the contoured output to enhance EM-31 anomalous response.

Ground Conductivity

Relative ground conductivity values ranged from -200 to 625 mS/m. Higher relative ground conductivity (>120 mS/m; light-to-dark blue shading) values were the dominant response in Block E. Six dominant "bullseye" anomalies are located in the north and east-central sections of Block E with good relative correlation to EM-61 differential response anomalies. The area of peak low response (light orange-to-red shading) is limited to near southwest corner of the survey area and corresponds to an approximate 350 mV EM-61 differential response.

Magnetic Susceptibility

Magnetic susceptibility values ranged from -40 to 25 ppt. Negative magnetic susceptibility (light orange-to-red shading) values were the dominant response over Block E with a number of peak point and linear responses mapped generally within the north and east and along the south and southwest margins of the survey area. Area background response was at or near 0 ppt indicated by light green shading. The highest negative responses are located to the south and southwest (nearest quenching station) with a peak value of approximately -35 ppt. There appears to be correlation between peak negative in-phase anomalies and EM-61 differential response (Figures 4.23.2-1D and 4.23.2-1B). Northwest-southeast trending linear anomalies (negative magnetic susceptibility response) in the north and east are bordered by areas of higher relative magnetic susceptibility (light-to-dark blue shading). Anomalies exhibiting a moderate response (between -6 and -10 ppt) have good correlation in size, shape, and orientation with ground conductivity response.

Ground Penetrating Radar
Radar signal penetration was limited to approximately 3 feet bgs using two-way travel time to depth conversion of 6 ns/ft. Signal attenuation is believed to be due to differences in soil characteristics such as moisture and clay content. Figure 4.23.2-2 shows two intersecting GPR profiles attained within the survey area. There are subsurface anomalies on Lines 1 and 9 that exhibit high amplitude responses in relation to the surrounding material.

4.23.3 Summary

Surface soil sampling results for Block E indicate that low concentrations of SVOCs and metals that exceed the screening criteria are present in surface soils and primarily in fill materials.

Subsurface soil sampling results indicate that relatively low concentrations of SVOCs, metals and dioxins that exceed the screening criteria are present in subsurface soils from 2 to 10 ft bgs. Field observations included large void spaces in soil borings BESB1 from 5 to 10 ft bgs, and BESB9 from 8 to 15.5 ft bgs. These void spaces appear to be basement or foundations of former structures located at Block E. Subsurface soil analytical results for samples collected from at depths greater than 10 ft bgs were below the screening criteria defining the vertical extent of detected constituents.

4.23.4 Recommendations

No further investigation of Block E is recommended.

4.24 Block F – Former metal screening area

4.24.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituents at Block F, the former metal screening area located in the northern portion of the southern parcel of the Site. A total of 8 soil borings were completed and were identified as BFSB1 through BFSB8. One surface sample from 0 to 2 ft bgs was collected from each soil boring. One subsurface soil sample from 2 to 10 ft bgs was collected from soil borings BGSB1 through BGSB4 and BFSB6. One or more subsurface soil samples from greater than 10 ft bgs were collected from each soil borings. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

The analytical results for soil samples collected and analyzed from Block F were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.24-1** through **Table 4.24-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Results are discussed in the following sections. Local background concentrations are also shown on each figure for reference purposes.

4.24.1.1 Surface soil

VOCs

VOCs were detected in surface soil samples collected for the Block F investigation. VOCs detected within Block F surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.24-1**. The distribution of VOC exceedances in surface soil is provided as **Figure 4.0.1-1**. Surface soil detects of VOCs were below the screening criteria.

SVOCs

SVOCs were detected in eight (8) surface soil samples collected for the Block F investigation. SVOCs detected within Block F surface soils included various PAHs and other SVOCs. Detected concentrations of SVOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.24-2**. The distribution of SVOC exceedances in surface soil is provided as **Figure 4.0.1-4**. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene concentrations exceeded the PRG within each surface soil sample location, with the highest concentrations observed at BFSB7 and BFSB8. Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene exceeded the screening criteria at one or more soil sample locations. In general, the highest concentrations of SVOCs were observed within soil borings BFSB7 and BFSB8 in the northern portion of Block F.

Metals

Metals were detected in the surface soil samples collected from all soil borings for the Block F investigation. In general, higher concentration metals detections were indicated in each surface soil sampling location over corresponding subsurface samples from the same boring. Detected concentrations of metals within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.24-3**. The distribution of metals detections is provided as **Figure 4.0.1-7**. Iron concentrations exceeded the PRG at each surface soil sample location, with the highest concentration observed at BFSB4. Antimony, arsenic, cadmium, chromium, copper, lead, manganese, nickel, selenium, vanadium, and zinc exceeded on or more of the screening criteria at one or more soil sample locations. In general the highest concentrations of metals were observed within soil boring BFSB4, including a highly elevated chromium concentration.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the available screening criteria and the results are presented as **Table 4.24-4**. Aroclor 1260 was detected within each soil boring except BFSB8. The distribution of PCB detections is provided as **Figure 4.0.1-10**. The PRG for total PCBs was exceeded within soil borings BFSB1, BFSB2, BFSB3, BFSB5, BFSB6 and BFSB7, with the highest concentration observed within soil boring BFSB7. The ESL for Aroclor 1260 of total PCB was not exceeded in any sample.

Dioxins

Dioxins were detected in both surface soil samples collected from BFSB4 and BFSB5. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH values within the surface soil were compared to the available screening criteria, and the results are presented as **Table 4.24-5**. The distribution of dioxin TEQ-HH is provided as **Figure 4.0.1-13**. The PRG for dioxin TEQ-HH was exceeded within soil sample BFSB5. Several of the individual dioxin constituent detections, as well as the TEQ-HH value in each sample, exceeded the ESL in each of the two (2) surface soil samples analyzed.

Cyanide

Surface soil samples collected for the Block F investigation were laboratory analyzed for cyanide. Detected concentrations of cyanide were compared to the available screening criteria, and the results are presented as **Table 4.24-3**. Cyanide was detected in surface soil samples collected from BFSB1, BFSB2, BFSB3, and BFSB7. Surface soil detects of cyanide were below the PRG but above the ESL in each of the four (4) surface soil samples analyzed.

4.24.1.2 Subsurface soil

VOCs

VOCs were detected in subsurface soil samples collected from the soil borings for the Block F investigation except BFSB4 from 4 to 5.6 ft bgs. VOCs detected within Block F subsurface soils included petroleum and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.24-1**. The distribution of VOCs is provided as **Figure 4.0.1-2** and **Figure 4.0.1-3**. Subsurface soil detects of VOCs from 2 to 10 ft bgs and from greater than 10 ft bgs were below the screening criteria.

SVOCs

SVOCs were detected in subsurface soil samples collected from BFSB1, BFSB3, and BFSB6 through BFSB8. SVOCs detected within Block F subsurface soils included various PAHs. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.24-2**. The distribution of SVOCs is provided as **Figure 4.0.1-5** and **Figure 4.0.1-6**. Subsurface soil detections of SVOCs from 2 to 10 ft bgs and greater than 10 ft bgs were below the screening criteria, except for two detections of naphthalene above the ESL in sample BFSB7 (14 – 15.5 ft) and BFSB7 (18 – 18.9 ft). Analytical detections for these two samples ranged from 190 J ug/kg to 160 J ug/kg, respectively.

Metals

Metals were detected in the subsurface soil samples collected from all soil borings for the Block F investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.24-3**. The distribution of metals is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. Concentrations of iron exceeded the PRG within subsurface soil sample locations from 2 to 10 ft bgs at soil borings BFSB2 through BFSB4 and BFSB6. Concentrations of arsenic exceeded the PRG at each location. Arsenic also exceeded the DAF 10 SSL in three subsurface soil samples (BFSB2, BFSB4, and BFSB6), each obtained from approximately 4 feet bgs, with

concentrations ranging from 10.8 to 11.9 ug/kg. Metals concentrations were below the DAF 10 SSL within subsurface soils from greater than 10 ft bgs. Concentrations of lead and vanadium exceeded the ESL in several samples.

PCBs
PCBs were not detected in subsurface soils during the Block F investigation.

Dioxins
Dioxins were detected in the sample of subsurface soil from 2 to 10 ft bgs collected from BFSB2, and from the subsurface soil samples greater than 10 ft bgs collected from soil borings BFSB6 and BFSB7. Dioxin concentrations within the subsurface soil were compared to the available screening criteria, and the results are presented as **Table 4.24-5**. The distribution of dioxins is provided as **Figure 4.0.1-14** and **Figure 4.0.1-15**. Within the above samples, one or more of the individual dioxin compound detections were above the ESL.

Cyanide
Cyanide was not detected in subsurface soils during the Block F investigation.

4.24.2 Summary

Surface soil sampling results for Block F indicate that low concentrations of dioxins and PCBs that exceed the screening criteria are present in the surface soil, with a slightly elevated concentration of total PCBs observed within the northern portion of Block F at BFSB7. Relatively low concentrations of SVOCs are present in surface soils throughout Block F, with slightly elevated concentrations observed to the north within BFSB7 and BFSB8. Field observations indicate only the presence of slag and fill materials in the surface soils, as well as possible cinders within BFSB8. Several metals constituents with concentrations that exceed the screening criteria are present in surface soils of Block F, with elevated concentrations detected within BFSB4.

Subsurface soil sampling results indicate that low concentrations of metals that exceed the screening criteria are present within subsurface soils. Arsenic and iron were detected at relatively low and generally uniform concentrations throughout Block F from 2 to 10 ft bgs, but do not extend to depths greater than 10 ft bgs. Other metals constituents such as lead and vanadium were found to exceed the ESL.

Surface and subsurface soils throughout Block F were observed to be relatively uniform, generally consisting of slag and fill materials intermixed with sand and gravel in the surface soils, underlain by layers of silty clay and sand and gravel. SVOCs and metals were observed in surface soils, and metals were observed in subsurface soils from 2 to 10 ft bgs.

4.24.3 Recommendations

No further investigation of Block F is recommended.

4.25 Block G – Former coal handling and coke battery production area

4.25.1 Soil sampling and analysis

Soil sampling activities were conducted to assess the nature and extent of constituents at Block G, the former coal handling and coke battery production area located in the northern portion of the southern parcel of the Site. A total of 17 soil borings were completed and were identified as BGSB1 through BGSB17. One surface sample from 0 to 2 ft bgs was collected from soil borings BGSB1 through BGSB13. One subsurface soil sample from 2 to 10 ft bgs was collected from soil borings BGSB1 through BGSB7 and BGSB14 through BGSB16. One or more subsurface soil samples from greater than 10 ft bgs were collected from soil borings BGSB1 through BGSB13 and from BGSB17. Soil samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. Statistical analysis was performed on dioxin and PCB analytical results to calculate dioxin TEQ-HH and total PCB values.

Additional soil sampling was completed during the supplemental RI, including the completion of one monitoring well (MW-30S). Soil sampling for VOCs, SVOCs, metals, PCBs and cyanide was completed during this additional assessment. This new monitoring well was also sampled during a supplemental RI groundwater sampling event.

The analytical results for soil samples collected and analyzed from Block G were compared to the available screening criteria that are considered applicable to this investigation: Region 9 PRGs, DAF 10 SSLs, and ESLs. The detection results for soil samples collected during this investigation are provided as **Table 4.25-1** through **Table 4.25-5**. The distribution of analytical results for detectable constituents are indicated on **Figure 4.0.1-1** through **Figure 4.0.1-15**. Results are discussed in the following sections. Local background concentrations are also shown in each figure for reference purposes.

4.25.1.1 Surface soil

VOCs

VOCs were detected in surface soil samples collected for the Block G investigation. VOCs detected within Block G surface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.25-1**. The distribution of VOC exceedances in surface soil is provided as **Figure 4.0.1-1**. Surface soil detects of VOCs were below the screening criteria. Benzene and selected other VOC were detected in each surface soil sample location except BGSB4 and BGSB8. However, surface soil detections of VOCs were below the screening criteria in all sampling locations, including the MW-30S boring.

SVOCs

SVOCs were detected in surface soil samples collected for the Block G investigation. SVOCs detected within Block G surface soils included various PAHs and other SVOCs. Detected concentrations of SVOCs within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.25-2**. The distribution of SVOC exceedances in surface soil is provided as **Figure 4.0.1-4**. Benzo(a)pyrene concentrations exceeded the PRG within each surface soil sample location except BGSB4 and BGSB6, with the highest concentration observed at BGSB8. Dibenz(a,h)anthracene concentrations exceeded the PRG at soil boring

BGSB8. Concentrations of benzo(a)anthracene and other SVOCs/PAHs did not exceed the PRG, DAF 10 SSL, or ESL at any surface soil sample location. In general, limited SVOCs detections were observed within surface soil samples in Block G.

Metals

Metals were detected in the surface soil samples collected from all soil borings for the Block G investigation, including thirteen metals that were detected in each surface soil sampling location. Detected concentrations of metals within surface soil were compared to the available screening criteria, and the results are presented as **Table 4.25-3**. The distribution of metals detections is provided as **Figure 4.0.1-7**. The concentrations of two metals (arsenic and iron) exceeded the PRG; the DAF 10 SSL was not exceeded within any surface soil samples. Arsenic concentrations exceeded the PRG at each surface soil sample location, with the highest concentration observed at BGSB1. Iron concentrations exceeded the PRG within soil borings BGSB1, BGSB2, BGSB7, BGSB8, and BGSB13, with the highest concentration detected at BGSB13. Arsenic, cadmium, chromium, copper, lead, manganese, nickel, vanadium, and zinc exceeded one or more of the screening criteria at more than one soil sample location. In general the highest concentrations of metals were observed at soil boring BGSB13.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for surface soil samples. Both PCB and total PCB concentrations were compared to the available screening criteria, and the results are presented as **Table 4.25-4**. Aroclor 1248, aroclor 1254, and aroclor 1260 were detected within soil borings BGSB7, BGSB8, and BGSB12. The distribution of PCB detections is provided as **Figure 4.0.1-10**. The PRG for total PCBs was exceeded within soil borings BGSB7, BGSB8, and BGSB12. The ESL for individual Aroclor constituents or total PCB was not exceeded in any sample

Dioxins

Dioxins were detected in the surface soil samples collected from BGSB1, BGSB4, BGSB6, BGSB8, and BGSB13. Statistical analysis was performed on analytical data for dioxins to calculate representative dioxin TEQ-HH concentrations for surface soil samples. Dioxin (2,3,7,8-TCDD) and dioxin TEQ-HH values within the surface soil were compared to the available screening criteria and the results are presented as **Table 4.25-5**. The distribution of dioxin detections is provided as **Figure 4.0.1-13**. The PRG for dioxin TEQ-HH was exceeded within soil boring BGSB8.

Cyanide

Surface soil samples were laboratory analyzed for cyanide, and the results are summarized on Table 4.25-3. Cyanide was not detected in surface soils during the Block G investigation.

4.25.1.2 Subsurface soil

VOCs

VOCs were detected in subsurface soil samples collected from the soil borings for the Block G investigation. VOCs detected within Block G subsurface soils included chlorinated, petroleum, and other non-chlorinated VOCs. Detected concentrations of VOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.25-1**. The distribution of VOCs is provided as **Figure 4.0.1-2** and **Figure 4.0.1-3**. Subsurface soil detects of VOCs from 2 to 10 ft bgs were below the

screening criteria. Benzene was found to be the single VOC constituent to exceed the PRG, DAF 10 SSL, or the ESL in soil samples from greater than 10 ft bgs. Benzene was detected within soil samples BGSB2 (16-18 ft), BGSB3 (18-20 ft), BGSB4 (16-18 ft), BGSB5 (24-26 ft), BGSB8 (16-17 ft), and BGSB9 (16-17.3 ft), with detections ranging from 120 ug/kg (BGSB8) to 11,000 ug/kg (BGSB4).

SVOCs

SVOCs were detected in subsurface soil samples collected from the soil borings for the Block G investigation with the exception of BGSB6 and BGSB7. SVOCs detected within Block G subsurface soils included various PAHs and other SVOCs. Detected concentrations of SVOCs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.25-2**. The distribution of SVOCs is provided as **Figure 4.0.1-5** and **Figure 4.0.1-6**. Concentrations of benzo(a)pyrene exceeded the PRG at several sampling points, including BGSB1 through BGSB5, and BGSB9 and BGSB14. Benzo(a)pyrene also exceeded the DAF 10 SSL at BGSB1, BGSB2, BGSB3, and BGSB4. Benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene concentrations exceeded the PRG one or more soil boring locations. In general, the highest concentrations of SVOCs within subsurface soils from 2 to 10 ft bgs were observed within soil boring BGSB3. SVOC detections were less frequent at sample depths greater than 10 ft bgs. Several SVOC detections were noted in sample BGSB1 (14-16 ft). Single SVOC detections, primarily naphthalene, were detected in samples BGSB2, BGSB4, BGSB5, BGSB9 and MW-30S. Naphthalene detections exceeded the ESL in these samples.

Metals

Metals were detected in the subsurface soil samples collected from all soil borings for the Block G investigation. Detected concentrations of metals for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.25-3**. The distribution of SVOCs is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9**. Within subsurface soils from 2 to 10 ft bgs, the concentrations of three metals (arsenic, chromium, and iron) exceeded the PRG, and two metals (antimony and selenium) exceeded the DAF 10 SSL. Within subsurface soils from greater than 10 ft bgs, the concentrations of antimony and chromium exceeded the DAF 10 SSL. Concentrations of arsenic exceeded the PRG within each subsurface soil sample locations from 2 to 10 ft bgs, with the highest concentration observed within BGSB16; arsenic concentrations did not exceed the DAF 10 SSL within the subsurface soils greater than 10 ft bgs. Within one or more subsurface soil samples from 2 to 10 ft bgs, chromium and iron exceeded the PRG and antimony and selenium exceeded DAF 10 SSL. Within subsurface soil from greater than 10 ft bgs, antimony exceeded the DAF 10 SSL at soil borings BGSB7 through BGSB10, and chromium concentrations exceeded the DAF 10 SSL at BGSB5.

PCBs

Statistical analysis was performed on analytical data for PCBs to calculate representative total PCB concentrations for subsurface soil samples. Detected concentrations of PCBs and total PCBs for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.25-4**. The distribution of SVOCs is provided as **Figure 4.0.1-11** and **Figure 4.0.1-12.** .Within subsurface soils from 2 to 10 ft bgs, aroclor 1248 and aroclor 1254 were detected within soil boring BGSB4, with the Arochlor 1254 detection exceeding the PRG. Aroclor 1260 was also detected in soil borings BGSB1

through BGSB5 in concentrations not exceeding the PRG. Within subsurface soils greater than 10 ft bgs, only aroclor 1260 was detected in soil borings BGSB1 and BGSB2. The PRG for total PCBs was exceeded within subsurface soil samples from 2 to 10 ft bgs within soil borings BGSB1 through BGSB4, with the highest concentration detected in BGSB2.

Dioxins

Dioxins were detected in the samples of subsurface soil from 2 to 10 ft bgs collected from BGSB2, BGSB7, and BGSB14, and from the subsurface soil samples greater than 10 ft bgs collected from soil borings BGSB9 through BGSB12 and BGSB17. Dioxin concentrations within the subsurface soil were compared to the available screening criteria, and the results are presented as **Table 4.24-5**. The distribution of dioxins is provided as **Figure 4.0.1-14** and **Figure 4.0.1-15**. The PRG for dioxin TEQ-HH was exceeded within soil boring BGSB2 from 2 to 10 ft bgs. One or more constituent detections were above the ESL in samples BGSB2, BGSB7, BGSB9 through BGSB12, and BGSB14.

Cyanide

Subsurface soil samples collected for the Block G investigation were laboratory analyzed for cyanide. Detected concentrations of cyanide for subsurface soil from 2 to 10 ft bgs and from greater than 10 ft bgs were compared to the available screening criteria, and the results are presented as **Table 4.25-3**. The distribution of cyanide is provided as **Figure 4.0.1-8** and **Figure 4.0.1-9.** Cyanide was detected in the subsurface soil from 2 to 10 ft bgs samples collected from BGSB1 through BGSB3, exceeding the ESL only. Cyanide was also detected in the subsurface soil greater than 10 ft bgs samples collected from BGSB3 , BGSB8, BGSB9 and BGSB10.

4.25.2 Summary

Surface soil sampling results for Block G indicate that low concentrations of SVOCs, metals, PCBs and dioxins that exceed the screening criteria are present in surface soils consisting primarily of silty clay fill materials.

Subsurface soil sampling results indicate that elevated concentrations of SVOCs, metals, PCBs and dioxins that exceed the screening criteria are present in subsurface soils from 2 to 10 ft bgs and were present primarily in the southeastern portions of Block G adjacent to AOC 13. Concentrations of SVOCs, PCBs, and dioxins were generally found at the same locations including BGSB1, BGSB2, BGSB3 and BGSB4. Subsurface soil sampling results also indicate that concentrations of benzene, antimony and chromium (total) that exceed the screening criteria are present in subsurface soils at greater than 10 ft bgs. Concentrations of benzene were observed at BGSB2, BGSB3, BGSB4, BGSB5, BGSB8, and BGSB9. The highest concentrations of benzene were observed in the eastern portions of Block G adjacent to AOC 13. Antimony concentrations slightly higher than the DAF 10 were observed in subsurface soils from 2 to 10 ft bgs and subsurface soils greater than 10 ft bgs. However, antimony was not detected above groundwater screening criteria in any of the monitoring wells in the vicinity of Block G.

4.25.3 Recommendations

No further investigation of Block G is recommended.

4.26 Great Miami River

The remedial investigation included an investigation of sediment and surface water quality in the Great Miami River. Ten sediment investigation samples (GMRSD-1, -2, -3, -4, -5, -6, -7, -8, -9, -14) and one background sample (GMRSD-15) were collected to evaluate sediment quality adjacent to the Northern and Southern sections of the Site. Three sediment investigation samples (GMRSD-16, -17 and -18) and one background sample (GMRSD-19) were collected to evaluate sediment quality adjacent to the location where the former COG pipeline crossed the Great Miami River. Five surface water investigation samples (GMRSW-1, -2, -3, -4 and -5) and one background sample (GMRSW-9) were collected to evaluate sediment quality adjacent to the Northern and Southern sections of the Site. One surface water investigation sample (GMRSW-10) and one upgradient surface water sample (GMRSW-11) were collected to evaluate surface water quality adjacent to the location where the former COG pipeline crossed the Great Miami River.

Figures 2.1 and 2.2 show the locations of the sediment and surface water samples collected adjacent to the Northern and Southern sections of the Site in the Great Miami River and Figure 2.3 shows the locations of the sediment and surface water samples collected in the river adjacent to the former COG pipeline. Sediment samples were laboratory analyzed for TCL VOCs and SVOCs (including PAHs), PCBs, TAL metals, and FOC. Twenty-five percent of the sediment samples were analyzed for acid-volatile sulfides and simultaneously extracted metals (AVS/SEM). The surface water samples were laboratory analyzed for TCL VOCs and SVOCs (including PAHs), PCBs, and TAL metals (total).

The analytical results of the sediment and surface water sampling program are summarized in Table 4.26.2-1 (VOCs Detected in Surface Water), Table 4.26.2-2 (SVOCs Detected in Surface Water), Table 4.26.2-3 (Metals Detected in Surface Water), Table 4.26.1-2 (VOCs Detected in Sediment), Table 4.26.1-3 (SVOCs Detected in Sediment), Table 4.26.1-4 (Metals Detected in Sediment), Table 4.26.1-5 (PCBs Detected in Sediment) and Table 4.26.1-6 (Cyanide Detected in Sediment). Table 4.26.1-1 summarizes and ranks chemicals detected in sediment in the Great Miami River based on comparisons to Region 5 Ecological Screening Values (ESLs).

4.26.1 Sediment

Concentrations of constituents detected in surficial sediments collected from the Great Miami River adjacent to the Site and where the former COG pipeline passed beneath the river were compared to ecological screening values (a thorough evaluation and comparison of the results to ESLs is presented in the SLERA).

In addition to acetone and methylene chloride (likely laboratory artifacts), toluene was the only VOC detected in sediment samples collected where the former COG pipeline passed beneath the river. None of the detected VOCs exceeded the associated screening value (all three compounds were also detected in the upstream sediment sample).

Various PAH compounds were also detected at concentrations exceeding the associated screening values. The highest downstream concentrations of PAHs were detected in GMRSD-16 and -18. All of the detected PAH compounds were also detected in upstream sample GMRSD-19 at higher concentrations.

Three metals, aluminum, barium and manganese, were detected at concentrations exceeding the associated screening values. The highest downstream concentrations were detected in GMRSD-17 and -18. These three metals were also detected in the upstream sediment sample at similar or higher concentrations.

Total PCBs were also detected at concentrations exceeding the screening value, the highest downstream concentration occurring in GMRSD-18.

Adjacent to the Site, various VOCs were detected in the sediment samples, however, only acetone, a likely laboratory artifact, was detected above the respective benchmark. Other detected VOCs included BTEX, carbon disulfide, and methyl- and cyclo-hexane. Sediment samples GMRSD-2 and -6, located downstream of AOC 13, typically contained the highest detected concentrations. VOCs were also detected in the upgradient sediment sample at similar concentrations.

Eighteen SVOCs, primarily PAH compounds, were detected in sediment samples collected adjacent to the Site at concentrations exceeding the respective benchmarks. All but five of these PAHs were also detected in the upgradient sediment sample. The highest concentration of each PAH compound was detected in sediment sample GMRSD-6, located downstream of AOC 13.

Various inorganic compounds, including cyanide, were detected in sediment samples collected adjacent to the Site. Twelve inorganic compounds and cyanide (cyanide was only detected in sediment sample GMRSD-1) were detected at concentrations exceeding their respective benchmarks. The highest concentrations were generally detected in sediment samples GMRSD-5, -6 and -9, located adjacent to the Southern section of the Site.

Except for GMRSD-14, low concentrations of PCBs were detected in every sediment sample collected adjacent to the Site, including the upgradient/background sample GMRSD-15. The ESL screening level (0.0598 mg/kg of total PCBs) was exceeded in sediment samples GMRSD-1, -5, -6 and -9. These samples are located adjacent to the Southern section of the Site.

4.26.2 Surface water

Concentrations of constituents detected in surface water samples collected from the Great Miami River adjacent to the Site and where the former COG pipeline passed beneath the river were compared to ecological screening values (a thorough evaluation of the results is presented in the SLERA).

PCBs, SVOCS and VOCs were not detected in surface water samples collected upstream and downstream of the former COG pipeline crossing. Four inorganic compounds (aluminum, iron, lead and mercury) were detected at concentrations exceeding their respective benchmarks in downstream sample GMRSW-10. The concentrations of these inorganic compounds, however, are generally consistent with the upstream sample results in GMRSW-11.

Adjacent to the Site, no PCBs, SVOCs or VOCS were detected above the applicable screening levels. Two metals, lead in samples GMRSW-1, -2, -3, -4 and -5 and mercury in samples GMRSW-1 and -5 were detected adjacent to the Site above the Region 5 ESLs. The concentrations of these inorganic compounds, however, are relatively low and consistent with

upstream/un-impacted river concentrations in GMRSW-9 and -11. As discussed in the SLERA, no further evaluation of these inorganic compounds is warranted.

4.26.3 Sediment and surface water summary and recommendations

The evaluation of surface water quality in the Great Miami River is complete and no further work is recommended. Surface water quality upstream of the Site and the former COG pipeline is consistent with downgradient surface water quality.

A biocriteria evaluation of the river was conducted in 2007 in conformance with a USEPA and OEPA approved work plan. Three biological indices were calculated to evaluate the fish and benthic communities: Index of Biotic Integrity (IBI), Modified Index of Well-Being (IWBmod), and Invertebrate Community Index (ICI). The community specific data, index scores, associated Qualitative Habitat Evaluation Index (QHEI) results, and other habitat observations indicate that Site has not adversely affected the biological communities in adjacent and downstream portions of the Great Miami River. Ohio EPA review of the workplan for this effort resulted in approval for AK Steel to "consider a "no effects" survey result as an off-ramp to further investigation of the Great Miami River for this site" (OEPA, 2007).

The evaluation of sediment quality in the Great Miami River where the former COG pipeline passed beneath the river (AOC 19) is complete and no further work is recommended. In general, the upstream sediment samples results for inorganics and most organics (such as PAHs) occur in sediments upstream of the former pipeline and are potentially associated with the migration from upstream sources. As discussed in the USEPA and OEPA approved SLERA, no further evaluation of sediment is warranted for AOC 19.

Additional evaluation of sediment quality in the Great Miami River was conducted in 2007. Based on the full set of sediment data, it has been determined that analytical results for sediment samples adjacent to and downstream of the site are consistent with or lower than detected concentrations in upstream samples. The complete results of the river sediment sampling effort is described within the Site BERA. Additionally, as presented in the Site Baseline HHRA, any potential risk to human health from COCs identified in the river surface water and sediment are consistent with or lower than those identified in upstream river segments. The calculated potential risks to human health from surface water and sediment for upstream, adjacent and downstream locations are provided in the Baseline HHRA (ENSR, 2008).

The SLERA, BERA, biocriteria report, and Baseline HHRA for the Site all indicate that the GMR has historic impacts from other sources, and that the Site is not adversely impacting river surface water or sediment. No further CERCLA evaluation of Great Miami River sediment, biota or surface water are merited.

4.27 Ambient air

The evaluation of the ambient air pathway is included in the HHRA. The evaluation includes an assessment on of the fugitive dust pathway and of the potential health effects of volatilization of organic and semi-volatile contaminants using soil data. The modeling approach used is outlined in the work plan and explained further in the HHRA. The methods involve the calculation of a particulate emission factor (PEF), which relates the concentration in surface soil for metals and semi-volatile contaminants whereas the exposure to volatile organic compounds present in subsurface soil involves the calculation of a soil-to-air volatilization factor (VF) is calculated using the equation (Equation 8) provided in the *Soil Screening Guidance: User's Guide* (EPA, 1996).

The VF is used to define the relationship between the concentration of the contaminant in soil and the flux of the volatilized contaminant to ambient air.
The only ambient air sampling conducted during the field investigation was performed for health and safety purposes and did not disclose any levels of particulate matter in the air which required any changes in health and safety procedures. No further ambient air evaluation is recommended.

4.28 Background sampling data

Approximately 20 discrete and 3 composite background soil samples were collected from both on and off-site areas from 0-2 feet, including along the former off-site COG pipeline (AOC 19), and analyzed for TAL metals, dioxins/furans and PAHs. Background samples collected at 3-4 feet were analyzed for TAL metals. At one location, (BGRR-2) a subsurface sample was collected and analyzed for PAHs as the media consisted of fill material. The concentration range for each compound detected in the background samples is presented on the individual Ranking Tables for each area of concern/block area. An evaluation of site conditions can be made by comparing background concentrations to the remedial investigation sample concentrations. Figure 2.4 shows the location of the background samples. The background analytical results (summary of detections only) are presented on Table 4.28.1-1 (SVOCs Detected in Surface Soil), Table 4.28.1-2 (Metals Detected in Surface Soil), Table 4.28.1-3 (Dioxins Detected in Surface Soil), Table 4.28.1-4 (SVOCs Detected in Subsurface Soil) and Table 4.28.1-5 (Metals Detected in Subsurface Soil). US EPA approved the background data set as complete and acceptable through its approval of the final Supplemental Site Investigation Work Plan (KEMRON, 2008).

4.28.1 On-site background sampling

Background samples were collected from the following on-site areas:

- Three slag composite samples **(BGSLAG-1AA, -2AA and -3AA),** each consisting of 4-5 individual aliquots, were collected in Block A (the former slag processing area) from a slag pile that appeared to be unimpacted from other operations and consisting entirely of historically processed slag. The background slag samples were analyzed for TAL metals and the results were compared to Block A investigation samples; comparison of Block A investigation samples, which consist mostly of slag (especially at the surface and near surface) to background soil samples is not appropriate due to different media types.
- Two soil samples **(BG-1AA and BG-1BA)** were collected from a shallow boring located in an undisturbed wooded area in AOC 21 and analyzed for TAL metals, dioxins/furans and PAHs (0-2 feet) and TAL metals (3-4 feet). The boring was located on the eastern side of an intermittent creek bed in the southeast corner of AOC 21. This sample location was selected because it is representative of an on-site area not impacted from historical site operations. This boring was also located the general vicinity of the former EPA background sample (former PRC background sample location SS-1).

4.28.2 Off-site background sampling

Background samples were collected from the following off-site areas:

- Three borings **(BGRR-2, BGRR-3 and BGRR-4)** were located on the western side of the railroad right-of-way that borders the western portion of the Site. BGRR-2 was

located east of the approximate area where the former Otto Coke plant was located. Two soil samples were collected from each boring. The 0-2 foot sample was analyzed for TAL metals, dioxins/furans and PAHs and the 3-4 foot sample was analyzed for TAL metals. At BGRR-2, the sample from 3-4 consisted of fill material and therefore also analyzed for PAHs.

- One boring **(BGPRK-5)** was located in a wooded area west of the Site located near the Great Miami River. Two soil samples were collected from the boring. The 0-2 foot sample was analyzed for TAL metals, dioxins/furans and PAHs and the 3-4 foot sample was analyzed for TAL metals.
- Two borings **(BGVNM-6 and BGVNM-7)** were located west of the Site near the Village of New Miami well field monitoring wells. **BGVNM-6** was located in the Village of New Miami well field and **BGVNM-7** was located in the general vicinity of the former Otto Coke plant. Two soil samples were collected from the boring. The 0-2 foot sample was analyzed for TAL metals, dioxins/furans and PAHs and the 3-4 foot sample was analyzed for TAL metals.

4.28.3 Off-site AOC 19 Former COG pipeline background sampling

Three background borings **(BGCOG-1, BGCOG-2 and BGCOG-3)** were located on the opposite side of the railroad tracks that border the former COG pipeline and between AOC 19 investigation samples. Surface samples were (0-2 feet) were collected and analyzed for TAL metals, dioxins/furans and PAHs. Subsurface samples were collected at 3-4 feet and analyzed for TAL metals.

4.29 Groundwater

During the initial RI Site investigation activities, a total of twenty-two shallow groundwater monitoring wells were installed and identified as MW-1S through MW-22S. Based on the shallow groundwater sampling results, site geology and groundwater flow directions, a total of ten intermediate depth groundwater monitoring wells were installed during a later phase of the initial RI, and identified as MW-4M, MW-6M through MW-10M, MW-13M, MW-14M, MW-20M, MW-21M. Also during the initial RI, three deep groundwater monitoring wells were installed in the southern portion of the Site (MW-1D, MW-2D, and MW-3D).

During the supplemental RI completed in 2008, an additional ten shallow monitoring wells (MW-23S through MW-32S), and two intermediate depth wells (MW-17M and MW-27M), were installed.

Monitoring well locations are shown on **Figure 2.1 and** and **Figure 2.2** in relation to all other Site sampling points. Groundwater sampling activities were conducted to assess the nature and extent of constituents within shallow and regional aquifers at the Site. Groundwater sampling events were completed in December 2005, April 2006, and June/July 2008. The groundwater analytical results have been evaluated on a site-wide basis.

Based on groundwater flow directions, groundwater samples collected from monitoring wells MW-6S, MW-10S and MW-14S are representative of upgradient groundwater quality.

Groundwater samples were submitted for analysis of VOCs, SVOCs, metals, PCBs, dioxins, and cyanide. The analytes detected in groundwater were compared to the applicable US EPA Maximum Contaminant Level (MCL).

4.29.1 Shallow groundwater

VOCs

VOCs were detected in shallow groundwater samples collected from several monitoring wells. VOCs detected within shallow groundwater consisted primarily of BTEX and related constituents. Many of the VOC detections were very low in concentration and "J"-flagged. The following VOC were detected in one or more well samples above the MCL: benzene (8 well samples), styrene (1 well sample), and toluene (1 well sample). No VOCs were detected from MW-2S, MW-3S, MW-4S, MW-5S, MW-7S, MW-14S, and MW-19S.

Detected concentrations of VOCs within shallow groundwater were compared to the US EPA MCLs, and the results are presented as **Table 4.29-1**. The distribution of benzene in groundwater is provided as **Figure 4.29.1-1**. Benzene was detected above the MCL in shallow monitoring wells MW-8S, MW-9S, MW-20S, MW-21S, MW-27S and MW-28S. Well MW-9S was the only well with multiple constituent detections above the MCL, with concentrations of benzene, styrene and toluene exceeding the MCL in only the 2005 sampling event. Shallow monitoring well MW-9S is located in the northeastern corner of AOC 13.

During the December 2005 sampling event, benzene detections were noted above the MCL in four shallow monitoring wells, with detections ranging from 9.7 (MW-20S) to 11,000 ug/L (MW-9S). In the June 2008 sampling event, benzene detections were indicated in nine monitoring wells (MW-8S, MW-9S, MW-26S, MW-27S, MW-28S, MW-29S, MW-30S, MW-21M and MW-27M), with detections ranging from 0.343 J to 610 ug/L. No detection of benzene was noted in wells MW-20s and MW-21S during the 2008 sampling event, with a method detection limit of 0.125 ug/L. A large decrease in benzene concentration was also noted in well MW-9S for the 2008 sampling event, where concentrations decreased from 11,000 to 204 ug/L. Additionally, the concentrations of styrene and toluene decreased to well below the MCL in the 2008 sampling of MW-9S. A decrease in concentration was also noted in well MW-8S, where concentrations decreased from 2,800 to 418 ug/L.

SVOCs

SVOCs were detected in some shallow groundwater samples consisting primarily of PAH constituents. Detected concentrations of SVOCs within shallow groundwater were compared to the US EPA MCLs, and the results are presented as **Table 4.29-2**. The concentrations of one SVOC, benzo(a)pyrene, exceeded the MCL in only one well sample (MW-8S) during only the 2005 sampling event. The concentration of benzo(a)pyrene was 45 ug/L. The distribution of benzo(a)pyrene in groundwater is provided as **Figure 4.29.1-2**. Benzo(a)pyrene was detected at 306 ug/L during the June 2008 sampling event. Multiple other PAHs were detected in MW-8S during the 2008 sampling event. Benzo(a)pyrene was not detected above a laboratory method detection limit of 0.05 ug/L in MW-8M during 2008 sampling and analysis. Benzo(a)pyrene also was detected above the MCL in well MW-27S (0.223 ug/L). Detections in two other wells, MW-23S (0.106 ug/L) and MW-1S (0.088 J ug/L) were both below the MCL.

For the most recent sampling event, additional SVOCs were detected at varying concentrations in eight shallow monitoring wells (MW-8S, MW-9S, MW-10S, MW-25S, MW-26S, MW-27S, MW-28S, MW-30S). Naphthalene was detected at elevated concentrations in a limited number of wells during 2005-2006 sampling. During the 2008 sampling event, naphthalene was detected in

the following wells: MW-8S (8490 ug/L), MW-9S (261 ug/L), MW-27S (12600 ug/L), MW-27M (817 ug/L), MW-28S (1040 ug/L). Frequent detections of other PAHs are noted in conjunction with these naphthalene detections.

Metals
Metals were detected in shallow groundwater samples. Detected concentrations of metals within shallow wells were compared to the US EPA MCLs, and the results are presented as **Table 4.29-3**. Arsenic exceeded the 10 ug/L MCL in wells MW-8S (10.7 ug/L), MW-14S (40.5 ug/L), MW-21S (85.4 ug/L), and MW-27S (12.7 ug/L) was not exceeded within any shallow groundwater samples. Lead exceeded the federal action level in well MW-21S (17.3 ug/L). Arsenic and lead are both noted as being elevated in soil, with soil concentrations found to be within background during the evaluation in the Baseline HHRA. These limited arsenic and lead groundwater concentrations are consistent with the elevated background conditions at the site. Of note is that one of the background groundwater points, MW-14S, has an elevated arsenic groundwater concentration.

PCBs
PCBs were analyzed for during the 2005 and 2006 sampling events. PCBs were not detected within any groundwater samples.

Dioxins
Dioxins analyzed for during the 2005 and 2006 sampling events. Dioxins were not detected within any groundwater samples.

Cyanide
Cyanide was detected in thirty-three of the Site monitoring well samples for the 2008 sampling event. The 2008 event included cyanide analysis for all groundwater samples, while 2005-2006 samples included select cyanide analysis.

Cyanide was not detected in 2008 groundwater samples collected from MW-10S, MW-13S, MW-14S, MW-16S, MW-25S, MW-26S, and MW-30S. Detected concentrations of cyanide were compared to the federal MCL of 200 ug/L, and the results are presented as **Table 4.29-3** . For the 2008 sampling and analysis of Site groundwater, the cyanide MCL was exceeded in samples from monitoring wells MW-1S, MW8S, MW-9S, MW-28S, and MW-29S. Detected concentrations ranged from 525 ug/L in MW-8S (filtered sample) to 22,600 J ug/L in MW-9S. With the exception of the MCL exceedance in MW-1S, all detections of cyanide that exceed the MCL are located at AOC 13.

4.29.2 Intermediate groundwater

VOCs
VOCs, consisting primarily of low concentrations of BTEX constituents, were detected in several intermediate groundwater samples during the three sampling events completed. In addition to BTEX, acetone was also detected in several wells, and cis-1,2-DCE and styrene was detected in one well below the screening criteria. Detected concentrations of VOCs within intermediate groundwater were compared to the US EPA MCLs, and the results are presented as **Table 4.29-1**.

Within intermediate depth monitoring wells, benzene was detected above the MCL in well MW-9M (6.7 ug/L) in the 2006 sampling event. Benzene was not detected in this well during the 2008 sampling event. Benzene was detected in well MW-27M, installed during the 2008 supplemental RI, at a concentration of 12.2 J ug/L. This was the only well in which benzene was detected above the MCL during the 2008 sampling event. Benzene was also detected in MW-21M (4.68 J ug/L) during the 2008 sampling event. The distribution of benzene in groundwater is provided as **Figure 4.29.1-1**. The remaining VOC concentrations in the intermediate groundwater samples were below the screening criteria.

Wells MW-9M, and MW-21M are located along the eastern boundary of AOC 13. Well MW-27M is located along the western boundary of AOC 13 approximately due west of MW-21M. Well MW-27M is also paired with MW-27S which contained a high benzene detection (610 ug/L) during the 2008 sampling event.

SVOCs

SVOCs were detected in several intermediate groundwater samples collected during the 2006 sampling event, and in only two well samples during the 2008 sampling event. Detected PAH concentrations from the intermediate groundwater samples were compared to the US EPA MCLs, and the results are presented as **Table 4.29-2**. The distribution of benzo(a)pyrene in groundwater is provided as **Figure 4.29.1-2**. Benzo(a)pyrene was detected in MW-8M along with low concentrations of eight other SVOC during the 2006 sampling event. MW-8M is clustered with MW-8S which indicated an MCL exceedence detection for benzo(a)pyrene during the 2005 sampling event. Monitoring well MW-8M, which is located along the eastern boundary of AOC 13, did not have detectable concentrations of benzo(a)pyrene in the 2008 sampling event. None of the 2005-2006 SVOC detections exceed the MCL.

SVOCs were also detected in a limited number of intermediate monitoring wells (MW-8M, MW-9M, MW-17M, MW-21M and MW-27M) during the 2008 sampling event. The detection of bis(2-ethylhexyl)phthalate at 9.65 ug/L exceeded the MCL of 6 ug/L. in well MW-17M. Well MW-27M had the highest number of SVOCs detected, with 1-methylnaphthalene, 2-methylnaphthalene and naphthalene detected at elevated concentrations (127 ug/L, 263 ug/L and 817 ug/L, respectively).

Metals

Metals were detected in intermediate groundwater samples. Detected concentrations of metals within intermediate depth wells were compared to the US EPA MCLs, and the results are presented as **Table 4.29-3**. The MCL was not exceeded within any intermediate groundwater samples. The federal action level for lead was exceeded in MW-4M, with a reported detection of 53 J ug/L for the 2008 sampling event.

PCBs

PCBs were not detected within the intermediate groundwater.

Dioxins

Dioxins were not detected within the intermediate groundwater.

Cyanide

Cyanide was detected in intermediate groundwater samples collected from MW-7M, MW-8M, MW-9M, and MW-21M in 2005-2006 sampling and analysis. Cyanide was detected in wells MW-

4M, MW-10M, and MW-14M. Detected concentrations of cyanide within intermediate groundwater were compared to the federal MCL of 200 ug/L, and the results are presented as **Table 4.29.1-8**. Cyanide in samples from the intermediate groundwater wells exceeded the MCL in wells MW-21M and MW-27M at AOC 13, with reported detections of 9920 and 3750 ug/L, respectively.

4.29.3 Deep groundwater

VOCs
Detected concentrations of VOCs from the deep groundwater samples (MW-1D, -2D and -3D) were compared to the US EPA MCLs, and the results are presented as **Table 4.29-1**. Acetone was detected in two deep groundwater samples in very low concentrations during the 2006 sampling event. No VOCs were detected in any of the three deep well samples during the 2008 sampling event.

SVOCs
Detected concentrations of SVOCs from 2005/2006 deep groundwater samples were compared to the US EPA MCLs and Region 9 Tap Water Standards, and the results are presented in **Table 4.29-2**. Only phenol was detected within the groundwater sample in MW-2D. The concentration of phenol met the Tap Water Standard; no MCL has been established for phenol. No SVOC were detected in the deep monitoring well samples during the 2008 sampling event; all quantitation limits were well below applicable regulatory standards.

Metals
Metals were detected in deep groundwater samples. Detected concentrations of metals within deep wells were compared to the US EPA MCLs, and the results are presented as **Table 4.29-3**. No MCL was exceeded within any deep groundwater samples.

PCBs
PCBs were not detected within the deep groundwater.

Dioxins
Dioxins were not detected within the deep groundwater.

Cyanide
Cyanide was not detected in any samples collected from the deep groundwater in any sampling event.

4.29.4 Summary

Metals MCL exceedances in monitoring wells included arsenic and lead. Arsenic exceeds the 10ug/L MCL in wells MW-8S, MW-14S, MW-21S and MW-27S. Arsenic is known to be naturally occurring at elevated levels in southwestern Ohio, and the presence of arsenic at a concentration of 40.5 ug/L in MW-14S, a background monitoring well, is further evidence of the ubiquitous nature of arsenic in the area. Soil arsenic concentrations at the site were determined to be consistent with background in both the surface and subsurface soils (see Site Baseline HHRA for additional discussion of background analyses), indicating that the arsenic concentrations in groundwater are not derived from historic Site activities.

Lead exceeded the federal action level of 15 ug/L in wells MW-21S (17.3 ug/L) and MW-4M (53 ug/L J). Lead has been demonstrated to be at background in soil sitewide, via analyses for surface and subsurface soils as presented in the Baseline HHRA. The limited detections of lead in MW-21S and MW-4M above the federal drinking water action level are not associated with elevated lead in soil samples from the same location, and considered an anomalous detection in groundwater.

Cyanide was detected at elevated concentrations (above the MCL) in MW-8S, MW-9S, MW-28S, MW-29S, MW-21M and MW-27M, which are also located within or near AOC 13.

VOCs and SVOCs exceeding the screening criteria are present in shallow groundwater, primarily in the vicinity of AOC 13. VOCs were detected at elevated concentrations within the shallow monitoring wells located along the eastern boundary of AOC 13, with high concentrations, primarily benzene, observed in MW-9S in the northeastern corner of AOC 13. Well MW-27S within AOC 13 also determined to have elevated benzene concentrations. The detected MW-9S benzene concentration decreased substantially between the 2005 and 2008 sampling events. SVOCs, including naphthalene, are also present within the shallow monitoring wells in the vicinity of AOC 13, with the highest concentration of naphthalene detected in MW-8S near the center of the eastern boundary of AOC 13.

Intermediate groundwater sampling results from the 2006 sampling event indicate that benzene was detected slightly above the US EPA MCL within MW-9M in the northeastern corner of AOC 13. Benzene was not detected in MW-9M during the 2008 sampling event. Benzene was detected in well MW-27M, installed during the 2008 supplemental RI, at a concentration of 12.2 J ug/L. This was the only well in which benzene was detected above the MCL during the 2008 sampling event. Benzene was also detected in MW-21M (4.68 J ug/L) during the 2008 sampling event. Other than these two benzene detections, only one of which exceeds the MCL during the 2008 sampling event, no other elevated VOC impacts are evident in intermediate groundwater.

Benzo(a)pyrene was the only SVOC to exceed an MCL. Other SVOCs were detected, with naphthalene being a significant constituent, based upon the Baseline HHRA findings. Other SVOCs also were frequently detected. The elevated SVOC detections are predominantly from samples collected in and adjacent to AOC 13.

Deep groundwater sampling results indicate no notable constituent detections for VOC, SVOC, metals, PCBs, dioxins, or cyanide, indicating an absence of Site impacts to deep groundwater.

The existing groundwater data indicate limited areas with groundwater impacts from historical site operations. Groundwater quality impacts above background include VOC, SVOC and cyanide in shallow wells. Significant detections of SVOCs occur in several wells. SVOC groundwater impacts are absent from deeper wells downgradient of AOC 13, including MW-7M (see Figure 3.4.2-2 and Tables 4.29-1 through 4.29-5).

4.29.5 Recommendations

Additional groundwater monitoring is anticipated to be necessary to confirm the current groundwater analytical results and to monitor conditions over time. The current groundwater monitoring network is sufficient for delineation and anticipated near term monitoring of Site

impacts to groundwater. The existing data indicate that COCs are confined to the surficial or shallow groundwater zone and some intermediate zones. Data from the deeper aquifer indicate that it has not been impacted by historic Site activities. Site data indicate that the impacted aquifers are unlikely to migrate to the Hamilton North Well Field (see Section 6 of this RI Report). Additional evaluation of impacted groundwater, through sampling of certain wells for COCs and gauging of water levels, is appropriate as the CERCLA process proceeds to a Site FS following approval of this RI Report.

4.30 AOC 22 – Riparian Area of Great Miami River

The previous draft versions of the RI Report did not include investigation of the Great Miami River riparian area adjacent to the site. During site visits regarding the RI progress and conduct of the Screening Level Ecological Risk Assessment, representatives of the AK Steel team and the regulatory team identified areas in which a tar-like material was observed on the ground surface of the riparian area. A survey of the riparian area was completed in July 2007. The results of that survey were included in the original Supplemental Remedial Investigation Work Plan, Figure 1 (ENSR, 2007).

Debris was visually identifiable on the embankment at the eastern edge of the parcel adjacent to the Great Miami River. Debris areas present within the riparian area also were included in the July 2007 survey and were mapped on the 2007 Supplemental Remedial Investigation Work Plan, Figure 1.

Based on the visually observed debris and the tar-like material, the riparian area was identified as a new area of concern, designated as AOC 22. USEPA agreed that investigation of AOC 22 should occur concurrently with additional RI field activities that were planned to fill data gaps and complete the Site RI.

A Supplemental Remedial Investigation Work Plan was drafted by ENSR and, after comment by EPA, a revision was submitted to US EPA and OEPA on January 28, 2008. USEPA approved the plan in a letter dated April 09, 2008. Based upon KEMRON's assumption of responsibility as the Site contractor, the plan as approved was reviewed with USEPA and OEPA in an April 28, 2008 meeting. Review of the specific proposed soil boring and monitoring well locations as compared to August 2007 Site maps and analytical results indicated that changes in some boring and well locations were appropriate. Detailed technical discussion with USEPA and OEPA also resulted in limited changes in the total number of soil borings and monitoring wells. The proposed sampling locations for AOC 22 were not significantly altered, however, as they were based primarily upon the observed tar-like substance and debris areas that were visually identified in the July 2007 site survey.

Debris present in AOC 22 has been observed to be primarily brick, stone, wood, deteriorated drum carcasses, and metal debris. Since none of the debris was observed to contain apparent wastes regulated under CERCLA, the focus of the remedial investigation of AOC 22 was to determine the potential impact of the tarry material, and any potential historic or current storm water runoff or other potential release from the main plant area to the riparian area. Sampling locations were determined based upon the visually identified tarry material within AOC 22, debris locations, and areas that were anticipated to receive storm water and/or historic runoff/potential releases from the Southern Parcel such that AOC 22 soils could be impacted. The data from

AOC 22 were also deemed necessary to provide a complete evaluation of the GMR, and were important for inclusion in the ecological risk assessment of the Site.

KEMRON finalized the scope of the Supplemental Remedial Investigation Work Plan and received EPA and OEPA approval of the final plan. AOC 22 was the first area to be sampled during KEMRON's mobilization to the field, which was initiated in May 2008. A USEPA oversight contractor representative was present at all times to oversee all sample collection and management at the site.

The scope of work originally called for collection of a total of twenty-one soil samples throughout the riparian area, including areas downgradient of AOC 1 and AOC 13. Soil borings within AOC 22 were limited to hand augered samples based upon site conditions that include steep embankments and vegetation. KEMRON noted to USEPA and OEPA that the feasibility to conduct sampling in these specific areas adjacent to AOC 1 and AOC 13 would be dependent upon health and safety considerations, considering the steep embankment. Upon conduct of May 2008 additional field reconnaissance in advance of sampling, KEMRON determined that the embankment was too steep to provide a stable and safe sampling location. KEMRON notified USEPA and OEPA that soil sampling of embankments below AOC 1 and AOC 13 would not be feasible based upon health and safety concerns. USEPA agreed to elimination of these sampling points due to the limiting site conditions. Therefore, the total number of samples within AOC 22 was reduced from the originally anticipated twenty-one to eighteen.

Soil borings were collected with a properly decontaminated hand auger to a depth of at least six inches below ground surface per the approved work plan. Multiple samples were hand augered to deeper depths. The work plan anticipated hand augering to the top of ground water. However, refusal was consistently reached prior to reaching the top of groundwater. Field records for the hand augered samples are included in Appendix A. All soil samples were analyzed for TAL VOCs, TAL SVOCs, TCL metals and PCBs in conformance with the USEPA approved work plan.

4.30.1 AOC 22 Surface soil

VOCs

VOCs were not detected in the majority of AOC 22 surface soil samples. VOC analytical results for all samples are presented as **Table 4.30-1**. Acetone was detected at 36.3 ug/Kg (or 0.363 mg/Kg) in sample AOC22RA1 and at a concentration of 7.54 ug/Kg (J), or 0.00754 mg/Kg in sample AOC22RA17. Acetone was not detected in any other samples, and no other VOCs were detected in these 2 samples. Acetone is a common laboratory contaminant, and these detected values are interpreted as a laboratory artifact. The detections did not exceed any screening levels. The single sample that had elevated VOC detections was AOC22RA18, which was located immediately downgradient of Block B. VOCs detected include cyclohexane, methyl acetate, methylcyclohexane, and xylenes. Detection limits for this sample were somewhat elevated due to matrix interference. None of the detected VOC concentrations exceeded any of the screening values.

SVOCs

SVOCs were detected in all surface soil samples within AOC 22. Laboratory analytical results are presented in **Table 4.30-2**. Detected compounds include 1.1-biphenyl, 1-methylnaphthalene, 2-methylnaphthalene, 2-methylphenol, acenaphthene, acenaphthylene, benzo(a)anthracene,

benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorine, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene were detected within AOC 22. Of these SVOCs, benzo(a)pyrene was the compound that exceeded one or more screening criterion with the highest frequency, with 16 samples exceeding at least one screening value. Samples AOC22RA2, AOC22RA11 and AOC22RA12 had the highest detectable concentration of SVOCs of all AOC 22 samples, with multiple SVOC analytes exceeding both the DAF10 and the industrial PRG. When considered against the background data for the Site, however, the SVOCs are not a significant issue at AOC 22 soils. Please see Section 6, regarding the human health risk assessment, for additional information.

Metals

Metals were detected in all surface soil samples collected for the AOC 22 investigation. Table 4.30-3 provides the analytical results for each sample. Arsenic, total chromium, iron, and manganese were detected at levels above one or more of the screening levels. Arsenic exceeded the DAF 10, and residential and industrial PRGs in six samples. Total chromium exceeded the DAF 10 in eleven (11) samples, and exceeded the residential PRG in 7 samples. Eight samples exceeded the residential PRG for iron, while none of these samples exceeded the industrial PRG. The manganese residential PRG was exceeded in two samples; neither of the sample results exceeded the industrial PRG. No ESLs were exceeded. When compared to background data for the Site, metals are not elevated to levels that cause unacceptable risk. Please refer to Section 6 of this RI Report for additional evaluation of AOC 22 risk.

PCBs

PCBs were detected in all AOC 22 surface soils. Table 4.30-4 provides the analytical results for each sample. The Total PCB residential PRG was exceeded in 11 of the AOC 22 samples, including AOC22RA1 through AOC22RA8, and AOC22RA14 through AOC22RA16, with analytical results ranging from 234.7 ug/Kg (AOC22RA2) to 2,311.7 ug/Kg (AOC22RA8). PCBs are not elevated in relation to the Site background data set, as is discussed further in Sections 6 and 7.

Dioxins

Dioxins were detected in surface soil sample AOC22RA18 above both the ESL and Region 9 residential PRG.

4.30.2 Summary

The most elevated detections of SVOCs are noted in samples AOC22RA2, AOC22RA11 and AOC22RA12. These samples were collected immediately adjacent to visually identifiable tarry material in AOC 22. PCB detections across the site are consistent with the ubiquitous PCB detections within the GMR, including upstream of the site. As is discussed within the Site BERA, the PCB concentrations measured in AOC 22 surface soils are from sample locations along the floodplain that is frequently influenced by rises in water levels of the River. Floodplains are a known deposition area for sediments that are disturbed and redistributed during a storm event. The presence of elevated PCB concentrations upstream of the site is indicative that the detected concentrations are not likely derived from the Site.

The detected constituents in sample AOC22RA18 closely resemble the constituents detected in Block B. Therefore, this sample is most appropriately associated with the CERCLA evaluation of Block B.

The tarry material observed on the ground surface within AOC 22 appears to be from two separate sources. The locations on the eastern side of the property, designated as tar material locations 3, 4 and 5 on Figure 4.30.2-1 appear to be a tarry substance historically disposed in AOC 22. An examination of soil boring records for locations AOC20CA12SB1, AOC20CA12SB2 and AOC20CA12SB3, as well as MW-5S, indicate that no tarry substance, sheen or odors were identified during installation of these borings. Based on the information recorded in these boring/well logs, no Site source is identifiable for the tarry material locations 3, 4 and 5.

Tarry material at locations designated as Tarry Material 1 and Tarry Material 2 on Figure 4.30.2-1 appear to be potentially related to the subsurface identification of a tarry substance in AOC10 and AOC 20 borings at the southern toe of the Southern Parcel. A tar-like substance, black material or potentially related soil staining was identified at varying subgrade depths in soil borings AOC10SB2, AOC20CASB4, AOC10SB1, AOC10SB3, AOC20CA4SB3B and AOC20CA4SB3A. A petroleum odor was observed in subsurface soils during installation of MW-4S. A black substance was observed in AOC22RA3 hand augered sample at a depth of approximately 18 inches below ground surface, and in AOC22RA4 at a depth of approximately 12 inches below ground surface. No odors, tarry material or other evidence of subsurface product was observed upgradient in MW-1D, AOC20CA4SB1, AOC10SB4 or AOC20CA4SB2. Additionally, no tar or other material was identified in hand augered samples AOC22RA5, AOC22RA6 or AOC22RA7. Please refer to Figure 4.30.2-1 for a graphic representation of the various AOC10, AOC 20 and AOC 22 surface and subsurface observations.

Based on field observations, it appears that the subsurface tar material identified in soil borings at the southern toe of the Southern Parcel may correlate to the observation of a tar-like substance at the AOC 22 locations identified as Tarry Material 1 and Tarry Material 2, as well as the black substance observed in the subsurface at sampling locations AOC22RA3 and AOC22RA4. The soil staining observed in two AOC 20 soil borings in this vicinity may also be related.

4.30.3 Recommendations

No further investigation of AOC 22 is recommended for purposes of the RI. It is anticipated that additional field evaluation may be appropriate to further quantify the tar material observed within AOC 22 in the locations denoted as tar material locations 3, 4 and 5 (Figure 4.30.2-1) for purposes of the FS. The FS is anticipated to include evaluation of remedial alternatives for the tarry material observed within AOC 22. The FS will evaluate potential CERCLA responses to address the tar material as identified in two general areas within AOC 22 (i.e., tar material locations 3, 4 and 5 area, and tar material 1 and 2 area/southern tip of Southern Parcel). No additional CERCLA evaluation is necessary for AOC 22 soils outside of these tarry material locations, based upon analyte concentrations having been demonstrated as consistent with background/off-site concentrations.

5.0 Contaminant Fate and Transport

The Draft RI Report (ENSR, 2006) stated that an assessment of contaminant fate and transport would be performed once the HHRA was completed and any additional supplemental sampling required for completion of the delineation of the site is completed, including the installation of additional monitoring wells and completion of one year of groundwater monitoring. Additional monitoring wells were installed in June-July 2008. One complete groundwater sampling event, including the wells installed as part of the 2008 Supplemental RI effort, was completed in July 2008.

A qualitative evaluation of the fate and transport of constituents in Site groundwater and soil is provided below for purposes of this RI report.

The key drivers of risk at the site are primarily benzene and SVOCs (specifically, PAHs), as is discussed in the HHRA (ENSR, 2008) and summarized in Section 6 of this RI Report. Media impacted from historic site activities include soil and groundwater. The primary cross-medium transfer mechanism of concern is leaching of contaminants from subsurface soil into groundwater.

Based upon the Site analytical data as presented in this RI Report, impacts from historic Site activities occur within soil and groundwater due to the presence of a limited number of VOCs, SVOCs, and cyanide.

As is presented in the uncertainty section of the HHRA, the estimated risk to humans from consumption of groundwater impacted by PAHs is overestimated, because attenuation or degradation of chemicals between the Site and the Hamilton North well field are not contemplated in the risk assessment methodology. This is clearly an overly conservative assumption, especially for organics like benzene which are known to biodegrade in the environment, and for PAH compounds like benzo(a)pyrene and naphthalene, which adsorb to soil particles and do not move appreciably in groundwater.

Elevated benzene concentrations are identified with historic Site activities within and near AOC 13. Benzene has not been detected in the downgradient areas of the Southern Parcel. All other VOC detections of significance on the property are associated with the elevated benzene concentrations at AOC 13. Generally, SVOC detections that may pose potential risk also are associated with the benzene impacted areas at AOC 13. Similarly, SVOCs are not detected at elevated levels in downgradient wells. These results confirm the conceptual model presented herein.

Further, the elevated concentrations of certain compounds in MW-27M samples, including benzo(a)pyrene and cyanide, may indicate entrainment of particles in the sample and may not be representative of dissolved concentrations. It is noteworthy that well MW-27M, installed in June 2008, required use of hand bailing methodology for purging and sample collection. This well was completed on June 30, 2008, developed on July 07, 2008 and sampled the following day (July 08, 2008). The turbidity of the sample was 289 ntu, which indicates entrainment of particulates within the sample. It is anticipated that this well will be redeveloped and resampled to provide additional evaluation of analyte concentrations at this specific location.

The absence of significant concentrations of constituents of potential concern in deep aquifer wells at the site indicates that the silty clays and clays at the site have provided an adequate barrier to migration of contamination from shallower intervals. It is anticipated that Institutional